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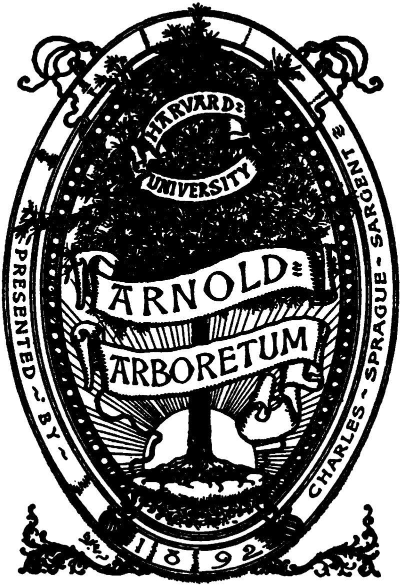
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UNIVERSITY
ARNOLD
ARBORETUM
PRESENTED BY
CHARLES SPRAGUE SARGENT
1892

ROYAL GARDENS, KEW.

OFFICIAL GUIDE
TO THE
MUSEUMS OF ECONOMIC BOTANY.

No. 2.

MONOCOTYLEDONS AND CRYPTOGAMS.

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GUIDE

TO THE

MUSEUM OF ECONOMIC BOTANY.

THE collections occupy three separate buildings within the Royal Botanic Gardens.

MUSEUM No. I. overlooks the Ornamental Water, and is directly opposite to the Palm-Stove.

MUSEUM No. II. is at the northern end of the Herbaceous ground, three minutes walk from No. I.

MUSEUM No. III., devoted chiefly to specimens of Timber and large articles unsuited for exhibition in the glazed cases of the other Museums, occupies the building formerly known as the "Orangery," at the north extremity of the Broad Walk leading to the Ornamental Water and Palm-Stove.

For an account of the object, origin, and arrangement of the Museums reference may be made to the introduction to the Guide to Museum No. I.

The building now known as No. II. Museum was the original starting point of the whole series of museums at Kew. The first guide to its contents was published by Sir William Hooker at his own cost in 1855. The following history of the present building is extracted from it:—

"In the year 1847 Her Majesty Queen Victoria was graciously pleased to command that those grounds at Kew which had been devoted to the kitchen and forcing department of the Palace should be added to the Royal Botanic Garden, together with the stoves and other buildings. An excellent brick structure, occupied in part by the dwelling of one of the foremen, and in part as rooms for preserving fruit for the use of the Palace, was thereby vacated; and it occurred to the Director that, with a little alteration, this might be made a deposit for all kinds of useful and curious *vegetable products*, which neither the living plants of the Garden nor the specimens in the Herbarium could exhibit; and that such a collection would render great service, not only to the scientific botanist, but to the merchant, the manufacturer, the physician,

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the chemist, the druggist, the dyer, the carpenter and cabinet maker, and artisans of every description, who might here find the *raw material* (and, to a certain extent, also the *manufactured* or *prepared article*) employed in their several professions, correctly-named, and accompanied by some account of its origin, history, native country, &c., either attached to the specimens or recorded in a popular catalogue. The suggestion was communicated to the heads of the Establishment, the Commissioners of Her Majesty's Woods and Forests, leave was asked to convert the building (at first in part) into a Museum, and orders were given for one large room to be formed, with a gallery, side-lights and skylight, and fitted up with glazed mural and table cases. The foundation of the Museum consisted of the Director's private collection (presented by himself), some few objects already belonging to the Garden, chiefly fruits and seeds, and some given by Mr. John Smith, whose son, Mr. Alexander Smith, received the appointment of Curator."

In 1857 Museum No. I., to which the collections illustrating the Dicotyledons and Gymnosperms had been removed, was opened to the public.

In 1863 Museum No. III. was opened as a Timber Museum, the basis of the collection being the large series of Colonial timbers obtained from the London International Exhibition of 1862.

In 1881 Museum No. II. was enlarged by the addition of a small west wing, containing two rooms and a second staircase.

GUIDE TO MUSEUM No. II.

The botanical character of the plants represented by the specimens and products in this Museum are chiefly these:—1st. The embryo plant in the ripe seed, has but one seed leaf, or cotyledon (hence called *Monocotyledons*) and the first leaves alternate. 2. The species having woody stems, form isolated bundles of wood, which usually do not increase in thickness year by year; once formed they remain unaltered in diameter, scattered through the pith-like substance of the stem. 3. The parts of the flowers are usually in threes. 4. The veins of the leaves, excepting in a few Orders, are parallel, or if diverging, not irregularly netted.

The collection occupies two floors, commencing in Room No. 1, on the left-hand side of the passage on entering by the North door. The number of each Room is affixed above or by the side of the doorway leading into it. The Cases and objects specified in this Guide are each numbered consecutively from Room No. 1.

GROUND FLOOR.

ROOM NO. 1.

CASE 1.

Orchid Order (*Orchideæ*). A large and very remarkable group, marked by the varied shapes and colours of their flowers, which are often of great beauty. The genera *Catasetum*, *Myanthus* and *Monachanthus* are interesting, in consequence of their trimorphic inflorescence illustrated in the coloured plates of *Catasetum macrocarpum*, Rich., and *C. cristatum*, Lindl. The species of Orchideæ are found all over the world, excepting in very cold and dry regions.

In cool climates they are usually terrestrial, while in the tropics they are generally found growing upon the trunks of the trees, &c. (epiphytes). From the beauty and singularity of their flowers, they are favourite hot-house plants. Few afford economic products.

No. 1. CORAL OR CRAWLEY ROOT (*Corallorhiza odontorhiza*, Poir.). It has a strong peculiar odour, and is used in North America as a diaphoretic and sedative.

No. 2. SĀLEP OR SĀLAB-MISRĪ. The tubers here shown are referred to unknown species of *Eulophia*. Though *E. campestris*, Lindl., and *E. herbacea*, Lindl., are generally named as species which furnish some portion of the Oriental Salep, there is no complete information on the subject. The Saleps known in commerce in Bombay, however, which are all imported from Persia, Kabul, and Northern India, are obtained from species of *Orchis*, including *O. latifolia*, L., and *O. laxiflora*, Lam., and not from *Eulophia* (*See* **No. 5**).

No. 3. FAHAM TEA, the dried leaves of *Angræcum fragrans*, Thouars. They are very fragrant, and are prepared in the Island of Bourbon, and sold and used as tea in France.

CASE 1. They are also made into cigars in Mauritius, and covered with tobacco leaf. (See *Kew Bulletin*, 1892, p. 181.)

No. 4. VANILLA. The fragrant fruit of *Vanilla planifolia*, And. A succulent, dark green perennial climber, found wild in hot, moist woods in South-east Mexico, where it is also extensively cultivated, especially in the province of Vera Cruz. Vanilla is also grown largely in Bahia, Mauritius, Bourbon, Madagascar, Seychelles, Java, Fiji, &c. Samples of these qualities are exhibited, also VANILLONS, the produce of wild or uncultivated forms. (See *Kew Bulletin*, 1892, pp. 212, 215.)

Vanilla is prepared by gathering the fruits or pods before they are quite ripe, after which they are gradually dried in the shade, or spread on woollen cloths and exposed to the sun, and finally rubbed over with oil. The aim is to develop and preserve the fragrance as much as possible. This fragrance is due to the presence of *vanillin* or *vanillic acid*, which is often seen deposited in minute crystals over the surface of the pods. Vanilla is used in confectionery to flavour chocolates, creams, liqueurs, &c.

The aromatic character of vanilla is also found in other species of Orchids. Seemann says (*Botany of the Herald*, p. 215) that the fruit of *Selenipedium Chica* "is highly
" esteemed as an aromatic by the inhabitants of the Isthmus
" of Panama, and used for all purposes for which real vanilla is
" commonly used."

CASE 2. Note leaves of *Goodyera pubescens*, R. Br., a North American plant, where it is said to have been used in scrofula. Note also specimens of SALEP from tubers of *Orchis mascula*, L., from Cawnpore, and from *O. anatolica*, Boiss., from the forests of Lycia.

No. 5. Numerous specimens of SALAB-MISRĪ from Madras, Bombay, Afghanistan, &c., furnished by species of *Orchis*. Dr. Aitchison states that the Salep imported in some quantity from Persia, by way of Herat to India, is furnished by *O. latifolia*, L., and *O. laxiflora*, Lam., while the Badsha or Royal Salep of Afghanistan is furnished by species of *Allium*, one of which is said to be *A. Macleanii*, Baker (see p. 23). Dr. Aitchison further says, in his "Notes on the products of
" Western Afghanistan and of North Eastern Persia," "at
" Meshad I was informed that *sālap-misrī* was an import from
" Egypt, and that it differed from the *sālab* of the country.

" I was unable to obtain any of it. *Eulophia campestris* is CASE 2.
" found in quantity in special localities in the Punjab, Balu-
" chistan, and Afghanistan. The tubers of this plant are
" simple, but on the whole larger than those of *Orchis*
" *laxiflora*. They are collected in the vicinity of Lahore,
" and I do not see why they should not also form part of the
" tubers exported from Afghanistan and Baluchistan into
" India."

SALEP is largely collected near Melassa (Milos) and Mughla (or Moola), South-east of Smyrna, and also brought there from Mersena, opposite the North-eastern Cape (Andrea) of Cyprus. The drug found in English trade is mostly imported from Smyrna; that sold in Germany is partly obtained from plants growing wild in the Taunus Mountains, Westerwald, Rhön, the Odenwald, and in Franconia. Salep is also collected in Greece, and used in that country and in Turkey in the form of decoction which is sweetened with honey and taken as an early morning drink. Salep possesses no medicinal properties, but from its forming a jelly when soaked in water, it is popularly regarded as being highly nutritious.

Observe roots of YELLOW LADY'S SLIPPER, or YELLOW MOCCASIN (*Cypripedium pubescens*, W.), used in North America as a tonic and stimulant medicine.

Ginger Order (*Scitamineæ*). Tropical herbs, with aromatic, creeping root-like stems (rhizomes), and very irregular flowers. A large number are East Indian.

No. 6. KÁFÚR-KACHRÍ. The sliced rhizomes of *Hedychium spicatum*, Ham. This is an important article of Indian trade, as it is the principal ingredient in the scented powder known as ABIR, used by the Hindoos in worship and as a perfume. The rhizomes are also said to be used in India as a carminative, tonic, and stimulant, as well as in veterinary medicine.

No. 7. TURMERIC. The rhizomes of *Curcuma longa*, L. A perennial herb, cultivated extensively about Calcutta and throughout Bengal, as well as in Ceylon, many of the East Indian Islands and Fiji. Its native country has not been determined, but is supposed to be some part of the Indian Peninsula.

Two kinds of Turmeric are known in commerce, one round and the other long. Both are produced by the same plant.

CASE 2. They are yellowish externally, hard and firm; of an orange-yellow or reddish-brown colour internally, and a waxy resinous fracture. When ground they form a fine orange-yellow coloured powder, which has an aromatic taste somewhat resembling ginger. It is used as a condiment in Indian cookery, and is a constituent in the well-known curry powder; also for dyeing wool and silk, and as a test for the presence of alkalies, which change its colour to a brown. Several varieties of turmeric are known in commerce as China, Bengal, Madras, Bombay, Java, &c.

Specimens are exhibited from various parts of India, Siam, Natal, and British Guiana.

No. 8. Roots, whole and sliced, of ZEDOARY (*Curcuma Zedoaria*, Rosc.), from India. The rhizomes possess aromatic, stimulant, and carminative properties.

Note tubers of EAST INDIAN ARROWROOT (*Curcuma angustifolia*, Roxb.), from Siam and Bombay, also sample of prepared Arrowroot from Bombay. Observe also PATIH TUMMU LAWUK, a farina obtained from the yellow roots of *Curcuma purpurascens*, Bl., in Borneo. The roots are dug up, beaten to pulp, and washed to separate the farina from the fibre. It is used in native confectionery, and mixed with water and perfume it is smeared over the faces of brides and bridegrooms.

CASE 3. The upper shelves of this Case contain various samples of the rhizomes of unnamed species of *Curcuma*.

No. 9. GRAINS OF PARADISE. The pungent seeds of *Amomum Melegueta*, Rosc., an herbaceous perennial of West Tropical Africa. Grains of Paradise are also known as GUINEA GRAINS and MELEGUETA PEPPER. They are almost entirely exported from that part of the coast of Guinea in Western Africa which is known as the Gold Coast, and principally from the stations of Cape Coast Castle and Accra. The total exports amount to about 2,000 cwts. annually, about half of which comes to this country, where they are used chiefly in the preparation of cattle medicines, for flavouring cordials, and for imparting an artificial strength to spirits, wine, and beer. In Africa they are largely used by the natives to season food, and are considered very wholesome.

Observe flowers and fruits of other species of West African Amomums, namely, *A. Daniellii*, Hook. f.; the MABOOBOO, *A. latifolium*, Afz.; *A. giganteum*, Hanb. and Oliv., &c.;

also MIOGO roots (*A. Mioga*, Thb.), the young shoots of which are used as food in Japan.

CASE 3.

NO. 10. Fruits of the KORARIMA CARDAMOM. The plant furnishing this fruit has never been botanically described, though Pereira proposed the name for it of *Amomum Korarima*. The history of this Cardamom is thus given in Fluckiger and Hanbury's "Pharmacographia": "The Arab physicians were acquainted with a sort of Cardamom called *Heil*, which was later known in Europe, and is mentioned in the most ancient pharmacopœias as *Cardamomum majus*, a name also occurring in Valerius Cordus and Mattiolus. Like some other Eastern drugs, it gradually disappeared from European commerce, and its name came to be transferred to Grains of Paradise, which to the present day are known in the shops as *Semina Cardamomi majoris*."

"The true *Cardamomum majus* is a conical fruit, in size and shape not unlike a small fig, reversed, containing roundish angular seeds of an agreeable aromatic flavour, much resembling that of the Malabar Cardamom, and quite devoid of the burning taste of Grains of Paradise. Each fruit is perforated, having been strung on a cord to dry. Such strings of Cardamoms are sometimes used by the Arabs as rosaries. The fruit in question is called in the Galla language Korarima, but it is also known as Gurági Spice, and by its Arabic names of *Heil* and *Habhal-habashi*."

The plant which furnishes Korarima Cardamoms appears to be indigenous over the whole mountain region of Eastern Africa, from the Victoria Nyanza to the countries south and south-eastward of Abyssinia.

Observe fruits of the BURO ELACHI or BENGAL CARDAMOM (*Amomum subulatum*, Roxb.), from various parts of India; also fruits and seeds of the XANTHIOID CARDAMOM (*Amomum xanthioides*, Wall.), a native of Tenasserim and Siam. The seeds of this plant, which closely resemble those of the Malabar Cardamom (*Elettaria Cardamomum*, Maton), are occasionally imported into the London market, either loose or still cohering in ovoid three-lobed masses, with the pericarp simply removed.

Fruits of other species of *Amomum* are here exhibited, including the Australian *A. Dallachyi*, F. Muell., and the HAIRY CHINESE CARDAMOM, supposed to be that of Loureiro's *A. villosum*, a plant about which very little is known. This Cardamom is said to grow in the province of Kwang-tung and the

CASE 3. Yang-yun district of Southern China. It is frequently used in medicine by the Chinese and has an aromatic and tar-like odour and taste, with some of the aromatic warmth of the ordinary Cardamom.

No. 11. MALABAR CARDAMOMS. The fruits of *Elettaria Cardamomum*, Maton, a perennial flag-like plant, from 6 to 12 feet high; found very abundantly, both wild and cultivated, in the moist, shady mountain forests of North Canara, Coorg, and Wynaad, on the Malabar coast, as well as in Ceylon, where the cultivation has so much increased that in 1885 nearly 300,000 lbs. were exported. Ceylon, indeed, now rules the market in this article. When fresh, Cardamoms are ovoid three-sided, fleshy green pericarps. They begin to ripen in October, and the gathering continues for two or three months during dry weather, the whole scape being picked and the fruits dried upon it; after which they are laid for a few days on mats to dry, the drying being finished by gentle fire heat. When properly dried they are of a pale greyish-yellow or buff colour. Cardamoms, however, vary in colour, as well as in size and shape; the shorter, or nearly globular form, are known in trade as *Shorts*, while the more elongated are called *Short longs;* they are further distinguished by the names of the localities in which they are grown, as Malabar, Aleppi, and Madras. A well-marked variety is found wild in the forests of Ceylon, the fruits of which are from 1 to 2 inches long, of a dark greyish-brown colour, and containing numerous large seeds.

Cardamoms are an agreeable aromatic, and are used chiefly as a condiment, as an ingredient in curry powder, as well as in medicine.

CASE 4. Note gilded and silvered Cardamoms from India.

A drawing of the Malabar cardamom plant is shown on the adjoining wall.

No. 12. GINGER. The root-like stem of *Zingiber officinale*, Rosc., cultivated in the warmer parts of Asia, the West Indies, Sierra Leone, &c. Of this well-known condiment several varieties are known in trade, distinguished by their quality, country of growth, &c. Gingers are either "coated" with the shrivelled rind, or "scraped," having it removed. Ginger is sometimes "bleached" by chloride of lime, or "whitewashed" with lime and water. 61,732 cwts. of Ginger were imported in 1893.

Specimens of Ginger from the East and West Indies, Africa, &c., are exhibited. CASE 4.

Note **Preserved Ginger**, the young shoots of the rhizome peeled and preserved in syrup; observe also rhizomes of Green Ginger, known as races or hands, and a fine specimen in fluid of Chinese Green Ginger, cultivated in the Delta of the Canton River.

No. 13. Galangal Root. The rhizome of *Alpinia officinarum*, Hance. A plant cultivated in the Island of Hainan in the south of China, and, as is supposed, in some of the southern provinces of the Chinese Empire. It has a strong, pungent, and spicy taste, and an agreeable aroma, and is considered an aromatic stimulant. The Greater Galangal, the rhizome of *Alpinia Galanga*, Willd., sometimes appears in the London drug market, and is substituted for that of *A. officinarum;* it may, however, be distinguished by its much larger size and pale buff colour internally.

No. 14. Fresh rhizome in fluid of Siamese Ginger, furnished by *Alpinia Galanga*, Willd.

Note rhizomes of *Alpinia nutans*, Rosc., found in Burma, Sylhet, and on the Coromandel coast, and often cultivated in Indian gardens. The rhizome is used in India as a substitute for Galangal, and sometimes for Ginger.

No. 15. Carib Baskets, from Dominica, made of the split stems of *Ischnosiphon Arouma*, Korn.; also a Suriana for carrying burdens on the back, made from the same material in British Guiana, where the plant is known as the Itukite. CASE 5.

A Quake, or Indian basket, from British Guiana, is also shown, made of the split stems of the Mucro (*Ischnosiphon pleurispicatus*, Korn.).

Observe also baskets and sieves from the Rio Uaupes, made of split stems of a species of *Maranta.*

No. 16. Arrowroot. The starch from the rhizomes of *Maranta arundinacea*, L., an herbaceous plant 4 to 6 feet high, native of Tropical America, Brazil, and the West Indian Islands, and under a slightly different form, which has been described as *M. indica*, Juss.; it is found in Bengal, Java, and the Philippine Islands. For the manufacture of Arrowroot the rhizomes, of which fine samples are shown, are dug up after having attained full maturity; they are next washed to remove the scales with which they are covered, and then

CASE 5. ground or grated to a pulp, which is washed so as to separate the starch from it. This starch is carefully washed in pure water, then drained and dried with a gentle heat. Very great care has to be taken throughout the whole process to prevent the introduction of dust, iron-mould, or any foreign substance which would spoil the colour or taste of the Arrowroot. Arrowroot is known in commerce by the names of the places where it is produced, as Bermuda, St. Vincent, and Natal, that from Bermuda being considered the best quality; it is an important and easily digested article of food, and is used in the form of puddings and blanc-manges.

On the bottom shelves note mats, made in India, of strips of the stem of *Phrynium dichotomum*, Roxb.; also starch or TOUS LES MOIS, prepared from the tubers of *Canna edulis*, Ker., an herbaceous perennial once much cultivated in Peru and the West Indies. Tous les Mois is a wholesome and nutritious food, adapted for infants, invalids, and convalescents, but it is not much used. It yields some of the Queensland Arrowroot. The microscopic granules are larger than those of any other starch used as food.

Note, necklaces from India and Eastern Africa made of seeds of INDIAN SHOT (*Canna indica*, L.).

CASE 6. In the upper part of this Case note leaf of BALISIER (*Calathea discolor*, Mey.), sometimes used in Dominica for lining baskets. Observe tubers of *C. Allouya*, Ldl., used as food in Trinidad and Dominica under the names of TOPEE TAMBOO, or TOKEE TAMBO (corruptions of *Topinambour*, the French name of the Jerusalem Artichoke). See *Kew Bulletin*, 1892, pp. 244, 245.

No. 17. BANANAS. The fruits of *Musa sapientum*, Linn., a plant cultivated almost everywhere in the tropics under a number of forms. In India, China, and the East Indian Islands the culture of bananas dates from extreme antiquity. There is no sufficient evidence of their existence in the New World prior to its discovery. The fruits are exhibited preserved in spirit, as well as decorticated and dried, as they are preserved for use as food in British Guiana. Banana meal and fibre from the stems and petioles are also shown, as well as specimens of cordage made from the fibre.

No. 18. Fruits of the PLANTAIN (*M. sapientum*, var. *paradisiaca*). An important article of food in tropical countries either cooked when fresh, or sliced and dried, or reduced to a meal. The plantain is also valued for the fibre which is obtained both from the stems and petioles of the leaves. Specimens of this fibre are exhibited in Case 7 from India, British Guiana, and Jamaica. Ropes and paper made from the fibre are also shown. Paintings of Bananas are shown on lower part of the descent staircase. CASE 6.

No. 19. MANILA HEMP. The fibre of *Musa textilis*, Nees., known in the Philippine Islands, from whence the whole of the supply comes, as ABACA. It is a most important fibre for cordage and ropes, and enormous quantities are imported both into England and the United States of America for these purposes. The fibre is obtained from the stems, which are cut down just before the flowering period. After flowering the fibre is said to be weaker, and consequently of less value. Samples are exhibited of ropes and cordage both in the natural state and dyed; hats, mats, and handkerchiefs of remarkably fine texture, also dyed fibre in imitation of human hair, and samples of paper made from old cordage. (See *Kew Bulletin*, 1887, p. 1. Much detailed information on the uses of the Manilla Hemp is also given in the *Kew Bulletin* for August 1894). CASE 7.

Note, fruits and seeds of various species of *Musa*, including *M. ventricosa*, Welw., from South-west Tropical Africa; *M. Banksii*, F. Muell., from Mount Elliot, Australia; *M. superba*, Roxb., from Travancore, also flowers, seeds, and fibre of the ENSETE of Bruce (*Musa Ensete*, Gmel.) from Abyssinia; and necklaces made of seeds of *M. livingstoniana* from Zambesi. CASE 8.

The *Kew Bulletin* for August 1894, contains a complete summary of information relating to Bananas and Plantains as well as to other species of *Musa*.

No. 20. FLAMBEAU, from Dominica, made of gum of the GOMMIER (*Bursera gummifera*, L.), wrapped in leaves of the BALISIER (*Heliconia* sp.).

Observe the huge flowering branches of unnamed species of *Heliconia* and *Phenakospermum* (*Ravenala*) *guianense*, Endl., with seeds embedded in a red woolly aril. Note also fruits of the TRAVELLER'S TREE (*Ravenala madagascariensis*, Sonn.), with a bright blue aril to the seeds. A fine trunk of this tree will be found in the Case opposite the door of Room No. 3, and a painting is shown on the wall of the landing of the descent stairs.

CASE 8. **Pine Apple Order** (*Bromeliaceæ*). A group of short stemmed plants with rigid spiny leaves and showy flowers. They are natives of the American continent and islands, from whence they have been distributed into Africa, India, and other parts. The plants yield fibres and edible fruits.

On the lower shelf observe leaves and fibre of the Caraguata (*Bromelia argentina*, Baker), from the Argentine Republic. (See *Kew Bulletin*, 1892, p. 191.)

No. 21. COLLAR, made of the very finely prepared fibre of *Bromelia Pinguin*, L., from Jamaica.

No. 22. CUIRASS of CHAGUAR fibre (*Bromelia Serra*, Gr.), from the Argentine Republic. When worn by the Mataco Indians it is padded before and behind with cotton from the fruit of the YACHAN (*Chorisia insignis*, H.B.). By rolling themselves in water the fibre swells and the whole becomes arrow-proof.

Near this observe sample of the fibre of *Bromelia fastuosa*, Ldl.

CASE 9. On the top shelf is a sample of fibre of *Karatas Plumieri*, E. Morr. (Bromelia Karatas, *Lem.*).

No. 23. PINE APPLES. The fruits of *Ananas sativus*, Schult. f. Introduced from South America into the tropics of the Old World, where it has become naturalised. The cultivation of the Pine Apple for supplying the markets of Europe and America has very much extended of late years, namely, in the West Indies, Tropical America, the Azores, Straits Settlements, as well as in the Australian Colonies. Tinned pine apples are now exported in very large quantities from Singapore, Bahamas, Fiji, and Natal. Observe samples of pine-apple fibre, prepared from the leaves, and of very fine textiles, prepared in the Philippine Islands.

On the lower shelves are stems of *Puya chilensis*, Molin., an arborescent plant of Chile.

Also specimens of NEW ORLEANS MOSS, or OLD MAN'S BEARD (*Tillandsia usneoides*, L.). Common in the West Indies, Southern United States, and Central America, hanging in festoons from the trees upon which it is epiphytal. The plant is collected, steeped in water or buried for a short time to remove the outer cellular portion, the fibrous part being dried and used for stuffing cushions, mattresses, &c.

CASE 10. **Bowstring Hemp Order** (*Hæmodoraceæ*). A family of perennial herbs distributed in Australia, South Africa, Tropical and North America, and Eastern Asia. The economic value of the plants is chiefly for their fibres. CASE 10.

No. 24. MIH-MUN-TUNG. Tubers of *Ophiopogon japonicus*, Ker. A low perennial with a creeping rhizome, producing small elongated tubers which are sold in the Chinese drug shops as a pectoral and tonic medicine. They have a sweet taste, and an agreeable, aromatic smell. They are said to be brought to Hankow in large quantities from the province of Chekiang.

No. 25. SINHALESE MAT, for couch, made of BOWSTRING HEMP, the fibre from the leaves of *Sansevieria zeylanica*, Willd. The plant is probably a native of Ceylon, India, and Tropical Africa, and is found also in Mauritius, Jamaica, &c. In Ceylon it is known as NEYANDA, and in India as MOORVA, MOORGA, or MAROOL. The fibre is very tough and elastic, and was used by the ancient Hindoos for bowstrings. Specimens of the fibre are exhibited as well as rope, twine, &c.

Samples of fibre of other species of *Sansevieria* are also exhibited as follows:—*S. guineensis*, Willd., *S. longiflora*, Sims., *S. cylindrica*, Boj., *S. Ehrhenbergii*, Schwein., &c. (See *Kew Bulletin*, 1887, p. 1, and 1892, p. 129.)

Iris Order (*Irideæ*). A group of perennial herbs with tuberous, or short creeping rhizomes, generally dispersed over the new and old worlds, more abundant in temperate than in tropical regions. The Order is familiar to us in the YELLOW FLAG and CROCUS.

No. 26. ORRIS ROOTS, the dried rhizomes of *Iris florentina*, L. A plant considered truly indigenous to the coast region of Macedonia and the south-west shore of the Black Sea. It is naturalised in the neighbourhood of Florence where, with *I. germanica*, L., and *I. pallida*, Lam., it is largely cultivated for the sake of its rhizomes. The two latter species, indeed, are supposed to furnish the largest quantity of orris root for exportation. It is known in Tuscany under the name of GIAGGIOLA. The rhizomes are dug up in August, trimmed, peeled, and dried in the sun. The dealers who purchase them from the peasants, separate them into different qualities.

The principal use of orris root is as a perfume, in consequence of its strong smell, resembling violets. "Essence of violets" is prepared from it, and it is also used as an ingredient in tooth powders. In France it is used for making issue peas, CASE 10. and it is also turned into beads and handles for children's corals, after being dyed red. Orris root is exported from Leghorn, Trieste, and Mogador.

No. 27. SAFFRON, the dried stigmas (the trifid orange-coloured tops of the central organ of the flower) of *Crocus sativus*, L. A native, probably, of Greece and Asia Minor, and perhaps of Southern Italy and Persia. Its cultivation in the East dates back to remote antiquity. At the present time it is grown for commercial purposes in France, Spain, and Italy, and on a smaller scale in Austria, Greece, Persia, Cashmere, China, and the United States. After the flowers are gathered, the stigmas are quickly removed and placed in sieves over a gentle fire to dry. It is estimated that from 7,000 to 8,000 flowers are required to yield about 17 ounces of fresh or 3½ ounces of dried saffron. Saffron was formerly used as a dye, but it has been superseded by cheaper materials; as a condiment or flavouring agent it is still used in Austria, Germany, and Switzerland, and also to some extent in England. By bird fanciers Saffron is considered useful in assisting the moulting of birds. It was formerly used in medicine as a stimulant and antispasmodic, but is now seldom or never employed.

Observe on lower shelf a magnified drawing of the Gladiolus disease (*Urocystis Gladioli*).

Narcissus Order (*Amaryllideæ*). A group of bulbous herbs or shrubby plants with fleshy leaves, and large showy flowers, very widely distributed, but chiefly found in warm or temperate parts. Their principal economic value is for the fibres contained in the leaves and stems of several of the species.

Observe on lower shelf a complete series of specimens illustrating the manufacture of cloth in Borneo, from the leaves of *Curculigo latifolia*, Dry. The leaves are soaked in water and beaten, which loosens the fibre which is afterwards prepared and woven into a very close cloth, known as LAMBA.

Note also bulb, and fibre prepared from bulb of *Buphane toxicaria*, Herb., S. Africa.

CASE 11. On the upper shelves of this Case note fruits of species of *Crinum*, *Alstromeria*, *Bomarea Shuttleworthii*, &c.

Also samples of MANILA or BOMBAY ALOE fibre (*Agave vvipara*, L.) and KERATTO fibre (*A. Morrisii*, Baker), from

Jamaica. The juice from the leaves has been used as soap and for cleaning metal. CASE 11.

No. 28. SISAL HEMP, from *A. rigida*, Mill. var. *sisalana*, Perrine. It is known in America as HENEQUEN, and is an important article of commerce in Mexico, being sent in quantities both to America and England, where it is found in competition with Manila hemp, and is said to be even used as an adulterant. A new industry in Sisal Hemp is being established in the Bahamas. (See *Kew Bulletin*, 1887, p. 3; 1889, pp. 57, and 254; 1890, p. 158; 1891, p. 175; 1892, pp. 21, 141, and 272.

No. 29. Fibre, rope, cordage, nets, table mats, and ornamental articles of AMERICAN ALOE (*A. americana*, L.). A large plant with long, thick, fleshy leaves, which contain a large quantity of strong, harsh fibre, used for coarse cordage, brushes, &c. The fibre is also a good paper material, samples of which are shown. In Mexico the plant is highly valued for the sap, which upon cutting out the flower spike just as it is ready to burst forth, together with some of the inner leaves, flows freely into the cavity thus formed. This is fermented, and forms an intoxicating drink called PULQUE, consumed in large quantities by the people.

From the flower spike excellent razor strops are made. Note pincushions made in Cannes from cross sections of the soft flower spike.

Observe fibre, rope, and cordage of ISTLE or MEXICAN fibre (*A. heteracantha*, Zucc.). Imported in large quantities for making cheap nail and scrubbing brushes. A Mexican hair brush made of the fibre is exhibited. (See *Kew Bulletin*, 1887, p. 5, and 1890, p. 220.)

No. 30. Fibre of ALOËS VERT, or MAURITIUS HEMP (*Furcræa gigantea*, Vent.), a plant widely spread throughout Tropical America, and growing also in India, Ceylon, Mauritius, and St. Helena. It is used for making cordage, and is imported into this country chiefly from Mauritius. CASE 12.

The fibre of an allied species (*Furcræa cubensis*, Haw.), from Jamaica, is also shown. (See *Kew Bulletin*, 1887, p. 8.)

In the upper part of the Case observe an oil painting of flowers of *Doryanthes excelsa*, Corr., painted in New South Wales by Lewin, the celebrated painter of birds; it formerly belonged to Allan Cunningham. Observe also fruits and fibre

CASE 12. from the same species, and fruits of *D. Palmeri* W. Hill. A flowering plant is shown in Cases No. 17 to 19.

Tacca Order (*Taccaceæ*). A small Order of perennial herbs with tuberous creeping rhizomes, natives of tropical regions both of the new and old worlds.

No. 31. ARROWROOT or starch from Fiji, prepared from the roots of *Tacca pinnatifida*, L. It forms a very important article of food in the South Sea Islands.

Yam Order (*Dioscòreaceæ*). Herbaceous or twining shrubs, with large tuberous rhizomes and net-veined leaves, differing in this respect from most other Monocotyledons. They are dispersed over the tropical and temperate regions of the globe.

No. 32. YAMS. The tubers of various species of *Dioscorea*, cultivated in nearly all tropical countries as important esculents. The tubers abound in farinaceous matter, and often reach a large size, weighing from 30 to 60 pounds. Their culture is considered to have spread from South-east Asia and the East Indian Islands, where at present *D. alata*, L., is the most commonly grown; a drawing of a tuber of this species is shown on a lower shelf. Observe biscuits of dried slices of yams and samples of yam flour from Jamaica.

Note also OTAHEITE POTATO the tuberous rhizome of *D. sativa, L.*, cultivated in India.

A drawing of *D. sativa* is shown on the wall of the descent staircase.

Observe on lower shelf rootstocks of ELEPHANT'S FOOT (*Testudinaria Elephantipes*, Lindl.) from which the slender climbing stems start. These rootstocks are more or less globular, and sometimes measure 4 feet across. They are known at the Cape as HOTTENTOTS' BREAD, because the fleshy inside has been eaten as food by the Hottentots in times of scarcity.

A sample of the root of the BLACK BRYONY (*Tamus communis*, L.) is here shown. It contains a quantity of acrid juice formerly used as a stimulating plaister in bruises, &c.

CASE 13. **Lily Order** (*Liliaceæ*). A large and beautiful Order, embracing several groups very dissimilar in habit and geographical distribution. Familiar examples are our garden lilies, aloes, asparagus, and onions.

No. 33. Bundle of BRAZILIAN OR LISBON SARSAPARILLA as imported. This kind was formerly held in much esteem in England, but is now rarely seen in the London market. It is packed in a manner very distinct from that adopted with other kinds, namely, in cylindrical bundles three or more feet in length, and about 6 inches in diameter, bound tightly together by the flexible stems of a bignoniaceous plant.

CASE 13.

Other kinds of sarsaparilla shown are Honduras, Guayaquil, Guatemala, New Grenada, and Tampico, the last-named being very seldom imported; a specimen is also shown from Fiji.

The sarsaparillas of commerce are the roots of various species of *Smilax* growing in the West Indies, South and Central America, and Mexico. The determination of the species affording the sarsaparillas employed in medicine is very difficult. *S. officinalis*, H.B.K., is said to be the source of Jamaica sarsaparilla, while *S. papyracea*, Poir., yields Brazilian, and *S. medica*, Schl., Mexican sarsaparilla.

The collection of sarsaparilla is effected by scraping away the thin stratum of earth which covers the roots which run horizontally under the ground; when laid bare they are cut off near the crown, a few slender roots being allowed to remain to assist the plant in renewing its growth; after collecting the roots they are dried, prepared, and packed in bundles for transportation.

Sarsaparilla is commonly regarded as a tonic, alterative and diuretic medicine, and is given in chronic forms of rheumatism, gout, cutaneous affections, &c. It is, however, not so much used as formerly.

Observe roots of *Smilax ovalifolia*, Roxb., a plant abundant in the low jungles in the Madras and Malayan Peninsulas. It has been used in India as a substitute for sarsaparilla; but, it is said, with unsatisfactory results. Dymock says, it is the country sarsaparilla of the Portuguese in Goa.

No. 34. CHINA ROOT (*Smilax China*, L.). A woody climbing plant of Japan, Formosa, China, Assam, Sikkim, Nepal, &c. The root is imported into Europe from the south of China, mostly from Canton. It was formerly much used in medicine in this country, but has now fallen into complete disuse. In India and China, however, it is still much esteemed in rheumatic and syphilitic complaints.

The roots of several other species of *Smilax* similar to the above have been substituted for it, amongst them being

CASE 13. *S. pseudo-China*, L., a plant of the United States, a specimen of which is shown.

On lower shelves note roots of the ASPARAGUS (*Asparagus officinalis*, L.), formerly used in this country as a diuretic. The blanched shoots are a well-known cultivated vegetable. Note also roots of *A. adscendens*, Roxb., *A. sarmentosus*, Willd., and *A. racemosus*, Willd. The first is the SAFED-MUSLI of India, said to be demulcent and tonic, and used as a substitute for Salep; the second is the ZATAR or MAKKI, and is used in bilious dyspepsia; while the third is known as SATAWAR, and is used as a demulcent, as well as in veterinary practice.

On the bottom shelf is a parasol cover made in Ireland of the fibre obtained from the SOLOMON'S SEAL (*Polygonatum multiflorum*, All.).

TABLE CASES.

TABLE CASE A. Commencing at the end of the room farthest from the door, the Case will be found to contain illustrations of **(No. 35)** NEW ZEALAND HEMP or FLAX (*Phormium tenax*, Forst.). The fibre is contained in abundance in the long sword-like leaves. Various attempts have been made to extract the fibre and clean it in a profitable manner for textile purposes, but hitherto the fibre prepared by European machinery has not equalled the native dressed fibre of the Maories, consequently it has not become used with us as a textile, though for rope and cordage it is a valuable material. The following illustrations of New Zealand hemp are here shown: fibre as imported in 1854, and known as "Maori flax," and fibre as imported at the present time—cleaned fibre, machine dressed fibre, fibre from plants grown in St. Helena, native dressed fibre in different stages of preparation; baskets made of split leaves, and sandals made of fibre. On the other side of the Table Case is shown also samples of fibre of native preparation, as well as fishing lines, and fabrics as sheeting and towelling of a mixture of New Zealand hemp and ordinary flax, made in English looms.

[In Case 16 in Room No. 2, or passage from entrance door, some mats, and cloaks of native New Zealand workmanship are exhibited. They are made of New Zealand hemp, and one garment is ornamented with the rolled leaves partially broken through and beaten out at the ends.]

TABLE CASE B.

In this Table Case observe—

No. 36. Samples of Aloes, the inspissated juice of several species of *Aloe*. It is obtained by cutting the leaves transversely and allowing the juice to exude spontaneously into vessels placed to receive it, after which it is evaporated to a proper consistency by artificial heat.

The principal sources of commercial aloes are *Aloe vera*, L., (A. vulgaris, *Lam.*,) a perennial found wild in Northern Africa, and also, probably, in Peninsular India, possibly also indigenous in the Canary Islands and Southern Spain. It has long been cultivated in Jamaica, Antigua, and Barbados. It yields common or Barbados aloes, which is imported in boxes holding about 56 lbs. each, or in gourds holding from 10 to 50 lbs. or more. *Aloe spicata*, L., *A. ferox*, Mill., *A. africana*, Mill., *A. plicatilis*, Mill., and others yield Cape or South African aloes, samples of which are shown, as well as Hepatic and Caballine aloes, Zanzibar aloes, and fine samples of Natal and Curaçoa aloes; also a very fine specimen of aloin. Observe a series illustrating the collections of Socotrine aloes from *A. Perryi*, Baker, "Teif rhiho," watery aloes in first stage as it runs from the leaves. It goes in this form only to the Persian Gulf, and sells at three dollars per skin of 30 lbs. Note skin used for collecting the fluid aloes from the leaves and a small skin of solid aloes "Teif Kasahul," third stage, after keeping about six weeks, exported generally as an article of commerce.

[In Case 15, in Room 2, observe stems of the Tree Aloe (*Aloe dichotoma*, L.) of Namaqualand, S.W. Tropical Africa, also a bushman's quiver for holding poisoned arrows, made of a hollowed stem of the aloe, together with the poisoned arrows and bushman's bow. A painting of the tree is shown on the wall of the landing of the descent staircase.]

On the other side of the Table Case are samples of fibre, cordage, paper, and other products from species of *Yucca*. Note bonnet made of the cuticle of the leaves of the West Indian Dagger Plant, *Yucca aloifolia*, L.; also razor strop from the flower spike of the same species.

No. 37. Fine section of stem of *Yucca brevifolia*, Engel., from Mohave Desert, California. Samples of fibre taken from the centre of the trunk are also shown, as well as photographs of the plant [one on landing of the descent staircase] and illustrations of the collecting of the stems for paper-making.

TABLE CASE B.

Observe portions of stem of *Y. baccata*, Torr., from Los Vegas, near Mexico, where it is used as soap.

TABLE CASE C.

In the third Table Case the Yuccas are continued, fibres of the following species being shown: *Y. angustifolia*, Pursh, *Y. gloriosa*, L. &c., &c.

No. 38. Section of stem of DRAGON TREE of TENERIFFE (*Dracæna Draco*, L.), showing fibrous centre. Sections of small stems are also shown, as well as photographs of the tree, and an old engraving showing "a view from the west of the "house and gardens of Colonel John Dominic de Franchis," at Orotava, with a large dragon tree 51 feet in circumference. An engraving of the famous colossal tree at Orotava, which was destroyed in a hurricane in 1867, is exhibited on the wall near the end window; also a photograph of a tree in the Royal Gardens at Ajuda, Lisbon. The tree derives its common name of Dragon tree from a red resin exuded by it, known as DRAGON'S BLOOD, samples of which are shown.

No. 39. DRAGON'S BLOOD from Socotra, the resin obtained from the trunks of *Dracæna Cinnabari*, Balf. fil. Also instruments used in collecting the resin, and skin such as is used for exporting the "Edah amsellah," or tears of Dragon's Blood, a sample of which is shown. Observe, also, a specimen of an inferior kind known as "Edah mukdehah," consisting of the melted dust made into cakes, and afterwards broken. Socotra Dragon's Blood has been identified as the *Kinnabari* of Dioscorides, and is distinct from Dragon's Blood of modern commerce which is furnished by *Dæmonorops Draco* (*see* p. 37). *Dracæna schizantha*, Baker, is believed to yield the Dragon's Blood of Somaliland; *D. Ombet*, Kotschy and Pey., that of Suakin. On other side of Table Case note fibrous stems of species of *Cordyline*; also fibres of *C. terminalis*, Kunth., *C. Pumilio*, Hook. f., *C. indivisa*, Kunth., and *C. australis*, Hook. f.

[In Case 15, in Room No. 2, observe a garment as worn by the natives of the Navigator Islands, made of leaves of *Cordyline terminalis*, Kunth., and in Case 16 note a native New Zealand garment made of leaves of an unknown species of *Cordyline*, dyed with the bark of a species of *Fagus*.]

No. 40. Models of different varieties of onions, the bulbs of *Allium Cepa*, L., a widely cultivated esculent. It is supposed to be originally a native of the East, and was well known

TABLE CASE C.

to the ancient Egyptians. Large quantities of onions are still consumed by the people in Western Asia, as well as in cold countries.

Note bulbs of *Allium* sp., known in India as Giant Salep and Punjabee piaz, *see* No. 5.

TABLE CASE D.

In the small Table Case in front of the adjoining window, observe Tchirish, the roots of *Asphodelus ramosus*, L., from Erzeroum. In 1855, it was proposed to collect this root in Tuscany, for the purpose of first distilling the spirit, and then using the fibrous residue for paper-making. The roots, which in their natural state contain a quantity of gum, are used, when powdered, by book-binders in Turkey as a substitute for gum or glue.

In the lower part of this Case note Oil Vessels made of the powdered roots of *Eremurus aucherianus*, Boiss. Of this singular manufacture Dr. Aitchison says, "The long fleshy roots, and some say, the leaves also of this species are collected and dried in an oven, then ground into powder which is converted into a thick jelly by boiling in water. This is employed in the manufacture of various vessels, called *Dabba*, for holding oil and clarified butter. There is a great trade in this material at Riu Khanf in Khorasan."

Room No. 2.

This is the passage leading from the entrance door. The Natural Order *Liliaceæ* is continued from Room No. 1, in Wall Cases commencing on the left side, close to the doorway.

CASE 14.

Observe on upper shelf whole and sliced bulb of Squill *Urginea maritima*, Bak. (Scilla maritima, *L.*), a perennial plant found abundantly in the Mediterranean district, also in Portugal, Morocco, Algeria, Corsica, Canary Islands, Cape of Good Hope, &c. The bulbs vary in size from that of a man's fist to a child's head. The smaller size is usually seen in commerce; the bulbs, however, mostly come to this country dried and sliced. They have no smell, but a disagreeable bitter taste. Squill is used in medicine as an expectorant in small doses, and as an emetic and purgative in large doses.

No. 41. Immature Flower Spikes of *Ornithogalum pyrenaicum*, L. Collected by poor people in the neighbourhood of Bath, and sold in the markets under the name of French Asparagus.

CASE. 14. Observe portion of a fruit spike of *Lilium giganteum*, Wall., from Bhotan, showing the winged seeds. A fully grown spike measuring 13 feet high and a circumference of 11½ inches at the base is shown in Cases 17, 18, and 19.

No. 42. Fibrous portion of bulb of UBAGURI (*Lilium cordifolium*, Thb.), from which the starch has been partially extracted by soaking and kneading; this is pounded in a mortar, kneaded into a mass and made into cakes by the Ainu people. The cakes are dried by hanging them in the huts, the discolouration being caused by smoke; they vary in size, some being over a foot in diameter.

In the same mount observe specimens of confectionery made by Japanese from the starch.

Note on middle shelf a sample of meal prepared from roots of *Erythronium Dens-canis*, L., and used as food in Japan.

Observe also the sliced and powdered corms of COLCHICUM or MEADOW SAFFRON (*Colchicum autumnale*, L.). For medicinal purposes the corms are collected at the end of June or beginning of July, and carefully dried and sliced. Colchicum is used as a cathartic and emetic in gout and acute rheumatism; in large doses it is an acro-narcotic poison.

The bulbs of *Tulipa montana*, L., under the name of GŌL-I-LĀLE, are collected and eaten in Afghanistan, and Dr. Aitchison says that what he believes to be these bulbs, when deprived of their external coats, are passed off for and sold under the name of SĀLEP at Bombay.

No. 43. TASTELESS HERMODACTYLS. These are supposed by some authorities to be the produce of *Colchicum variegatum*, L., a native of the Levant; but the Hermodactyls known in India also as SURINJAN, found chiefly in Indian bazaars, are imported into Bombay from the Red Sea ports and from Persia. A great deal of uncertainty exists as to their origin. They are used in India in medicine.

No. 44. SHAMBALIT, the corms of *Merendera persica*, Boiss. They are collected in Afghanistan, and used in native medicine.

Observe WHITE HELLEBORE root (*Veratrum album*, L.). A large perennial herb, common in all the great mountain regions, as the Alps, Pyrenees, Balkans, as well as in the hilly country of France, Germany, Portugal, Italy, &c. White Hellebore root is imported in bales, principally from Germany,

CASE 14.

and is used internally as a powerful emetic and purgative, and externally as an irritant. Its principal use, however, is in veterinary medicine. *Veratrum viride*, Sol., is the AMERICAN WHITE HELLEBORE, a marsh plant of the North United States, Canada and Alaska. It is closely allied to the last, and is by some botanists combined with it; its properties are very similar.

(CASES 15 and 16, *see* p. 22.)

On the lower shelf are specimens of the roots and fruits of SABADILLA or CEVADILLA (*Schœnocaulon officinale*, A. Gray). A bulbous herb of Mexico, Guatemala and Venezuela, used at one time as an anthelmintic, as well as in rheumatism and neuralgia.

CASES 17 to 22.

The remainder of the Cases in this room, numbered from 17 to 22 inclusive, contain chiefly specimens of palm products of too large size to be included in their proper sequence of the arranged genera; they will therefore be found described under their respective heads.

ROOM No. 3.

CASE 23.

Spiderwort Order (*Commelinaceæ*). A group of perennial creeping or erect herbs, natives chiefly of tropical and sub-tropical countries. Very few of them have any economic interest.

Aneilema tuberosa, Ham., is the SIYAH MUSLI of India, where the roots are said to have tonic and astringent properties, and are used in headache, giddiness, fevers, &c. Specimens are exhibited on the upper shelf.

Rush Order (*Juncaceæ*). A family of perennial or rarely annual plants with narrow grass-like, sometimes terete foliage, widely distributed in Australia, South Africa, and Antarctic America.

Observe DILLY BAG made of the culms of BOOMBI (*Xerotes multiflora*, R. Br.), from New South Wales; also basket made of culms of *X. longifolia*, R. Br., by the Yarra tribe, South-eastern Australia.

No. 45. GRASS TREE GUM, the produce of several species of *Xanthorrhœa*, as *X. hastilis*, R. Br., *X. arborea*, R. Br., *X. quadrangulata*, F. Muell., *X. Preissii*, Endl., and *X. australis*, R. Br. These are natives of Australia, to which country indeed they are limited. They form erect trunks, sometimes several feet high, crowned with a head of long narrow leaves, from the centre of which spring a long slender flower spike. They are

CASE 23. known as GRASS TREES, and in Western Australia and Western South Australia the arboreus species are sometimes known as BLACK BOYS, and form a conspicuous feature in the landscape. The resin is exuded spontaneously from the bases of the old leaves, and often coats a considerable portion of the stem. Some kinds are of an orange-yellow colour, while others are more or less red. They have been used for making spirit varnishes, and for staining wood.

In the centre of the Case observe a very fine block of *Xanthorrhœa* resin from Victoria, and in the lower part of the Case some stems of the above-named species.

CASE 24. Further examples are shown in Case 24, which is occupied by large stems and flower spikes of *Xanthorrhœa arborea*, R.Br., and an allied Australian plant, *Kingia australis*, R. Br. Some fine trunks of *Xanthorrhœa* and *Kingia* are exhibited in Museum No. III.

CASE 25. **No. 46.** SPLIT RUSHES (*Juncus effusus*, L.), prepared for wicks for rush lights, and ANCIENT RUSH HOLDER, used in Hampshire for holding rush lights before the general introduction of candles.

In the lower part of this Case is a meal bag made of the culms of the COMMON RUSH, formerly used in the Island of Lewis. The manufacture appears now to have died out.

Rushes are still largely used for chair bottoms.

No. 47. JUNCIO. Rush matting made of the culms of *J. maritimus*, Lam. Plain and coloured, from San Fernando, Spain. Also a Moorish mat, made from the same plant, from Morocco.

No. 48. PALMITE (*Prionium Palmita*, E. Mey.). A native of South Africa in marshy situations. The heart, or cabbage, near the summit is edible. The leaves are used for thatching, plaiting, and basket work, and the strong fibrous network at the base of the old leaves has been used for brushes, ropes, stuffing mattresses, and was at one time proposed for paper-making. A hat and other articles made of the leaves and fibre are shown.

CASE 26. **Palm Order** (*Palmeæ*). Perennial woody plants, mostly attaining the size of large trees, with a crown of spreading fan-shaped or feathery leaves. They are almost exclusively tropical, a few species only extending into cool countries. They are very important economic plants, and furnish the daily food, habitations, and utensils of a large proportion of the human race. CASE 26.

This large order is divided into six tribes, as follows:—

TRIBE I. *ARECEÆ.* In Case 26, arranged on the back and on the shelves will be found spadices and fruits of the following palms: *Areca triandra*, Roxb., from Buitenzorg and India. Fruits of *A. Aliciæ*, F. Muell., Queensland. Spadix and fruits of *Veitchia Joannis*, Wendl., Fiji. Sheathing base from leaf of *Archontophœnix cunninghamiana*, W. & D. (Seaforthia elegans, *Hook.*), Australia. Spadices of the NIKAU palm of New Zealand (*Rhopalostylis sapida*, W. & D.), and of the Norfolk Island palm (*R. Baueri*, Hook.). Fruits of *Kentiopsis macrocarpa*, Brongn. and Gr., from New Caledonia, and of the UMBRELLA PALM (*Hedyscepe canterburyana*, W. & D.), from Lord Howe's Island. Also of *Dictyosperma album*, W. & D., from Mauritius and Bourbon. Observe in Cases 21 and 22, in Room 2 or Passage, a stem, leaf, samples of fibre and rope made from the same of the MADAGASCAR PIASSABA PALM (*Dictyosperma fibrosum*, C. H. Wright). (See *Kew Bulletin*, 1894, pp. 358, 359.)

No. 49. ARECA NUTS or BETEL NUTS. The seeds of *Areca Catechu*, L. A tree 40 or 50 feet high, a native probably of the Malay Archipelago, where it is much cultivated, as well as in the hotter parts of India, Ceylon, South China, the Philippine Islands, &c. The fruits, which vary in size and shape, from that of a hen's egg to that of a walnut, are produced in great abundance, each tree yielding annually about 300 fruits. Areca or Betel nut seeds are usually about the size of a nutmeg, and like it are ruminated with reddish brown irregular markings; they are astringent, and have been used in diarrhœa, as well as for the expulsion of tapeworm. The principal use of the Betel nut, however, is as a masticatory. For this purpose it is prepared in the East by boiling in water, or it is used in a young and tender state by first cutting it into small pieces, and rolling them up with a little lime in the leaf of the Betel pepper, which is then chewed. It is regarded as a preventive against dysentery; but its chief use is to give a red hue to the lips and mouth, and a fragrance to the breath. TABLE CASE.

The exhibits consist of whole and sliced seeds, raw and roasted, prepared for chewing, from various parts of India; also Betel chewing apparatus from Perak, chalk or lime holder from Timor Laut, instruments used in India for slicing Betel nuts, TABLE CASE. and a model, representing native Indian women pounding chunam or lime. Water buckets are also shown, made of the spathe of the palm from Perak, caps worn by the natives of the Tulu caste, also from the spathe, and fans from Formosa and China.

CASE 27. This Case contains leaves, spadices, and fruits of several unimportant species of palms, including *Cyrtostachys Renda*, Bl., *Ptychosperma filifera*, Wendl., *Oncosperma filamentosum*, Bl. Fine spadices and fruits of *Euterpe edulis*, Mart., and *E. oleracea*, Mart., known as the CABBAGE PALM. Also MOUNTAIN CABBAGE PICKLE from the fresh succulent spadix, and baskets made of the leaves from British Guiana.

No. 50. Flambeau, made of gum of *Bursera gummifera*, enclosed in a portion of the spathe of *Euterpe oleracea*, Mart., from Dominica.

CASE 28. The upper part of this Case contains spadices of *Œnocarpus distichus*, Mart., *Œ. Bataua*, Mart., and other species.

Observe photographs of the ROYAL PALM, *Oreodoxa regia*, Kunth., a West Indian palm; also a photograph of the celebrated Avenue in the Botanic Gardens, Rio de Janeiro. [See *North Gallery*, Nos. 63 and 825.] Samples of fibre and wood of this species as well as of *O. oleracea*, Mart., are also shown. A stem of this latter is exhibited in a Case in the passage opposite the doorway of this room, being too large to be included here.

No. 51. Quivers made of leaves of *Attalea* sp., containing poisoned arrows, used in the Gravatanas or Blow-pipes of Brazil. " The sheathing bases of the petioles [of *Œnocarpus Bataua*] give out from their margins numerous long spinous processes of a very singular character. They are from eighteen inches to three feet long, of a black colour, flattish, and generally broken or fibrous at the point. They are much sought after by the Indians, who use them to make arrows for their 'Gravatanas,' or Blow-pipes." One of these latter, made of the stem of *Iriartea setigera*, Mart., from the Rio dos Puros, Brazil, is shown in Case 18, Room No. 2. The arrows are sharply pointed at the end, which is covered with curari poison for three or four inches down, and slightly notched, so that it may break off in the wound.

Note combs worn by the Uaupe Indians, made of these woody spines, bound together with strips of the flower stalk of *Gynerium saccharoides*, H.B.

CASE 28.

No. 52. Portions of the prickly aerial roots thrown down from the stem, above the surface of the ground by the ZANONA palm (*Socratea exorhiza*, Wendl.). They are used by the Indians to grate cassava upon.

In Case 22, in entrance passage, is shown a sort of trumpet, known as JURUPARIS by the Indians of the Rio Negro. It is used on certain festal occasions, and is made of the stem of the PAXIUBA PALM (*Socratea exorhiza*).

CASE 29.

In this Case are shown leaves and spathes of *Deckenia nobilis*, Wendl. and *Acanthophœnix crinita*, Wendl. The former a native of Seychelles, and the latter of Mauritius and Bourbon.

CASE 30.

Leaves of *Stevensonia grandifolia*, Duncan, and *Nephrosperma vanhoutteana*, Balf. fil., from Mauritius; also fruits of *Howea belmoreana*, Becc., known as the CURLEY PALM, and *H. forsteriana*, Becc., known as the FLAT or THATCH-LEAF PALM, both from Lord Howe's Island, are shown in this Case.

CASE 31.

Note leaves and fruits of *Verschaffeltia splendida*, Wendl., stems and spadices of *Hyophorbe Verschaffeltii*, Wendl., and spadices of *Hyophorbe amaricaulis*, Mart., from Mauritius and Rodrigues. A large stem of this last-named species will be found in a Case in the passage opposite the entrance to this room.

CASE 32.

No. 53. Thatch made of the leaves of a species of *Geonoma*, used for covering houses by the Arawak Indians, in British Guiana.

Observe spadix and spathe of *Wallichia caryotoides*, Roxb., and photograph of *Didymosperma distichum*, Hook. f., (Wallichia disticha, *T. Anders.*) Both Indian palms. A trunk of this last species is shown in the Case in passage opposite entrance to this room.

No. 54. Fruits of the EJOW, or GOMUTI PALM (*Arenga saccharifera*, Lab.). A tree 30 to 40 feet high, native of the Sunda, Molucca, and Philippine Archipelagos, and cultivated in Malacca, Siam, and Cochin China. It is one of the principal sources of PALM SUGAR, or JAGGERY, a sample of which is exhibited. It is obtained by boiling and evaporating the saccharine juice which flows upon wounding the young spadices. When fermented this juice yields toddy or palm wine, and when the trees have become exhausted sago of good quality, and in large quantities, is obtained from the trunks by

CASE 32. splitting them up, scraping out the cellular portion, washing it and granulating the starch. The tree dies after flowering.

Note in bottom of Case, TAROMBA, or native sandals made of the leaf sheath of *Arenga saccharifera*, known in Borneo as the ANAN.

No. 55. EJOW, or GOMUTI fibre. The black, stiff horse-hair-like fibre from the bases of the leaf stalk of the *Arenga*. It is very strong, and is used for cordage, ropes, and brushes.

CASE 33. **No. 56.** Fine spadices of the GOMUTI PALM.

No. 57. Spadix of WINE PALM (*Caryota urens*, L.). A lofty palm of Malabar, Bengal, Assam, and various other parts of India, and found also in Ceylon. It yields from the spathes during the hot season a large quantity of toddy or palm wine. From the farinaceous portion of the trunk a kind of sago is made, used by the people as food. From the bases of the leaves a strong, black fibre is obtained, known as Kittool fibre.

No. 58. Samples of KITTOOL FIBRE in the rough and prepared states. This fibre, which is used in India and Ceylon for making ropes, brushes, brooms, baskets, &c., has recently come much into use in England for broom-making. For this purpose it is cleaned, softened by steaming, then treated with linseed oil, which makes it permanently supple, and finally combed. Brooms are exhibited made of this fibre.

CASE 34. In the upper part of this Case is shown portions of stems and fruits of *Leopoldinia pulchra*, Mart., a palm of the Rio Negro, where it is called JARÁ. The cylindrical stems are used by the people for making fences between their houses and gardens.

No. 59. PIASSABA, or BASS fibre, raw and prepared, from the sheathing bases of the leaves of *Leopoldinia Piassaba*, Wallace, a short, thick-stemmed palm of Brazil and Venezuela. It furnishes the Para Piassaba of commerce so much used, together with that from Bahia (see *Attalea funifera*, p.49) in making bass brooms, specimens of which are exhibited.

No. 60. Fruit heads of *Nipa fruticans*, Thb., a low stemless plant growing in the salt marshes of the islands and coasts of the Indian Ocean. The inside of the fruit is edible, and from the spathe a juice is obtained from which sugar is made, and a strong spirit is distilled, specimens of which are shown. The latter is said to be largely consumed in the

Philippines. Observe cigarette wrappers made of the leaves and commonly used in Malacca. CASE 34.

No. 61. Base of stem of IVORY NUT PALM (*Phytelephas macrocarpa*, Ruiz et Pav.). A plant with a prostrate stem and leaves often 20 feet long, inhabiting the banks of rivers and rivulets in Central America and New Grenada. The fruits are borne in large globular heads, one of which is seen attached to the stem. As the seeds ripen they become very hard, like ivory, and are consequently known as VEGETABLE IVORY, and are largely used for making coat buttons, chess men, and for various other useful and ornamental articles as well as for snow flakes in theatres.

No. 62. Model of Temple made of Vegetable Ivory.

In Table Case immediately opposite Case 34 are shown entire matured fruits and numerous small articles made of Vegetable Ivory. On the other side of the Table Case, near the Betel Nut Palm, observe portions of stem of the WAX PALM of New Grenada and Venezuela (*Ceroxylon andicola*, H. & B.), showing the wax naturally secreted on the stem. Samples of the wax moulded and candles made from it are also shown. One tree is said to yield about 25 lbs. of wax. TABLE CASE.

A fine trunk of this palm, grown in the Azores, is exhibited in Museum No. III.

The remainder of this Table Case is devoted to the BUSSU PALM (*Manicaria saccifera*, Gaertn.), a native of Brazil and *M. Plukenetii*, Gr. & Wendl. from Guatemala. The spathes of the former are very fibrous and are used to make caps, mats, &c., specimens of which are here exhibited. The leaves are used for thatching houses, and a photograph is shown illustrating this use. The nuts occur amongst drift fruits and are known as SEA COCOA-NUTS.

ROOM NO. 4.

TRIBE II. *PHŒNICEÆ*. In the upper part of this Case are baskets, &c. made of the leaves of *Phœnix reclinata*, Jacq., from Natal. CASE 35.

No. 63. Model in brass illustrating the manner of collecting and preparing DATE SUGAR in India.

DATE PALM (*Phœnix dactylifera*, L.), a noble tree from 40 to 80 feet high, widely spread over Southern Europe, Northern Africa, and South-eastern Asia. It is invaluable to the desert

CASE 35. tribes of Northern Africa and the Sahara, whose most important wants it supplies. The fruit is the common food of themselves and their cattle, while the huts and houses are chiefly constructed of Date wood. The culture of the Date is of great antiquity. It was emblematic of the Jewish nation. Jericho was the City of Palm Trees.

The Date Palm is cultivated at Bordighera exclusively for its leaves, which are blanched by being tied up during growth, and are exported thence in large quantities for use in church festivals.

No. 64. Basket or crate made of petioles of the Date Palm from Egypt. In the upper part of the Case is shown a hanging flower basket also made of the petioles of the date palm, from Bordighera. Note also rope made of fibre of leaves from India and wood of Date Palm from Algeria.

CASE 36. The upper part of this Case contains baskets, rope, cordage, &c. made from Date Palm leaves, also walking sticks made of the petioles, and a large series of Date fruits from Baghdad and India. Observe also samples of DATE SUGAR and DATE SPIRIT, and on lower shelf of Case sections of Date Palm trunk.

CASE 37. **No. 65.** MATS made in Zanzibar from leaves of *Phœnix spinosa*, Schum. Thonn.

No. 66. MATS and BASKETS made in Ceylon from the leaves of *Phœnix sylvestris*, Roxb. Observe also wood of the same species, also Jaggery and Sugar Spirit, and model of two toddy collectors cut in the wood of the SHOLA. Photographs of branching trees of this palm are also shown.

On the mantel-piece of this room is a large fishing net made of the petioles of this Palm from Ceylon.

CASE 38. TRIBE III. *CORYPHEÆ.*—**No. 67.** SCREENS or SHIELDS made of the large leaves ornamented, of the TALIPOT Palm (*Corypha umbraculifera*, Lin.). These leaves grow to a very large size. They are commonly used by the Sinhalese for umbrellas, one outspread leaf, it is said, being sufficient to give shelter to seven or eight persons; they are also used for tents, being strong, light, and waterproof, and very easily set up. (A tent covering 23 feet by 6 is shown in Case 17, Room No. 2.)

No. 68. SINHALESE BOOKS made of the folded leaves of the TALIPOT Palm. They are used for writing on with a brass or iron style.

CASE 39. On back of Case observe KADU or SLEEPING MAT made of leaves of GEBANG palm (*Corypha Gebanga*, Blume), from the island of Ceram; also a hat made of the leaves from Java, and strips of the unexpanded leaves used in Borneo for sewing.

No. 69. Fruits of *Nannorhops ritchieana*, W. & D. (Chamærops ritchieana, *Griff.*), a palm of North-west India, Afghanistan, and South-east Persia. A branching trunk is shown in Museum No. III. Observe scurf from bases of leaves, used for tinder for matchlocks, also leaves, and mats made of the leaves, together with cordage, and shoes or sandals, with needle such as is used in their manufacture in Afghanistan. A mallet or club made of the wood of *Quercus Ilex*, used for beating out the leaves, is also shown.

CASE 40. **No. 70.** Board from the outside portion of the trunk of the PALMETTO ROYAL (*Sabal umbraculifera*, Griseb.), used in Jamaica to board up the sides of native huts and to form partitions.

No. 71. SLEEPING MAT made from the young leaves, and HATS made from the inner portion of the young leaves of the PALMETTO ROYAL. They are said to be very cheap and durable. Observe fancy baskets made from the same material, also rope made of the young leaves split and twisted.

On the bottom shelf of this Case is a BEEHIVE, used in Jamaica, made of a portion of a trunk of the PALMETTO ROYAL, by removing the soft cellular portion and enclosing one end with a board.

Note fruits of *Sabal umbraculifera*, Griseb., and its ally *S. blackburniana*, Glazebr.

No. 72. Hats, Baskets, Fans, &c., made of the leaves of the BERMUDA PALM (*Sabal blackburniana*), also plaited leaves from which the hats are made.

Note a section of the wood, showing the thick fibre of the Palmetto (*S. Palmetto*, Lodd.), also a brush made from the same and photographs of the tree.

In the first two divisions of the Case under the stairs in the exit passage are portions of spathe, spadices, and leaf of the SAVANNAH PALM (*S. mauritiæformis*, Griseb. and Wendl.) from Trinidad.

CASE 41. Observe in upper portion of this Case a leaf and portion of spadix of *Teysmannia altifrons*, R. & Z. (In Case No. 21

CASE 41. in entrance passage, at the foot of the staircase, is shown a larger leaf of this Palm from Sumatra.)

Observe also fibre of the torn leaves of *Serenoa serrulata*, Hook. f., known as the SAW PALMETTO, in the Southern United States, where the fibre is used for stuffing cushions. Also a brush made from a portion of the stem from which the fibre has been freed from the cellular tissue.

Fruits of this Palm are also shown.

TABLE CASE A. In the Table Case opposite are exhibited various articles made from the leaves of the SOUTH EUROPEAN FAN PALM (*Chamærops humilis*, L.). These consist of baskets from Spain and Portugal, also baskets, hats and mats made of plain and dyed leaves from Tangier, hand brooms and brushes from Gibraltar, cigarette cases covered with the finely split and dyed leaves in marqueterie designs from Tangier. Note also rope made of the twisted leaves, and specimens of CRIN VÉGÉTAL or fibre from the leaves dyed black and used as a substitute for horsehair. The young and tender crown of the plant is sold as food in the south of Spain. Specimens are exhibited.

CASE 41. **No. 73.** MAT made of the dyed leaves of the CARNAUBA or BRAZILIAN WAX PALM (*Copernicia cerifera*, Mart.). Samples of leaves dyed black and red are shown in the lower division of this Case, also a hat made from the leaves, all from Bahia.

No. 74. Portion of stem and section of the BRAZILIAN WAX PALM, showing the spiral arrangement of the leaf scars, which in some plants proceed from left to right and in others from right to left, also a piece of the wood turned and polished to show its hardness. A fine trunk is also shown in Case in entrance passage, opposite doorway to Room No. 3.

No. 75. Samples of WAX obtained from the leaves and candles made from the wax.

A specimen of the roots is also shown, used in medicine as a substitute for Sarsaparilla.

In Cases 20 and 22 in entrance passage at the foot of the staircase, are exhibited leaves, fruits and spadices of *Pritchardia* spp. from Fiji, also a fine expanded leaf of *Pritchardia Gaudichaudii*, Wendl.

No. 76. Walking sticks of PENANG LAWYERS, the stems of *Licuala acutifida*, Mart.; a stem of *Licuala peltata*, Roxb., from India, is shown in Case under the stairs in entrance passage, opposite doorway to Room No. 3.

CASE 41.

In Case 18, in Room No. 2, is shown an umbrella from Bengal, made of bamboo and rattan canes, and covered with the leaves of *Licuala peltata*.

No. 77. Portion of stem and section of AUSTRALIAN CABBAGE PALM (*Livistona australis*, Mart.). The stem is very soft and fibrous, and the central portion, when young and fresh, is said to be eaten by pigs.

The leaves are used for plaiting; samples of the plait, together with a hat and belt made from it, are shown.

CASE 42.

Observe fruiting spadix of *Livistona chinensis*, Mart., and fans made of the leaves, also rope made of the fibrous sheaths of the leaf stalks.

Note at back of Case, leaf of *Trachycarpus martianus*, Wendl., and section of stem and fruits from Khasia.

No. 78. Box covered with fibre obtained from the bases of the leaf stalks of the CHINESE COIR or HEMP PALM, *Trachycarpus excelsus*, Wendl. (Chamærops Fortunei, *Hook.*). Brushes, cordage, and other articles made of the fibre are also shown, as well as a stand for holding a flower vase, made at Bordighera of the petioles and leaves.

CASE 43.

No. 79. RAIN CLOAK and HAT of fibre of *Trachycarpus excelsus*, as worn by the Chinese.

Note also a great coat made of the leaves of the same palm, and a plant of *Thrinax Morrisii*, Wendl., a dwarf palm of Anguilla, and a portion of a mat made from the leaves.

CASE 44.

No. 80. Leaves of SILVER TOP PALMETTO or SILVER THATCH PALM (*Thrinax argentea*, Lodd.), imported from Cuba for making hats, &c

Note also broom from Dominica, made probably of the leaves of this palm.

TABLE CASE A.

In the Table Case in front of Case 42 are further illustrations of the uses of these leaves, consisting of mats, baskets, &c., and instrument used by the St. Albans platters for splitting the leaves for hat-making. (An opened leaf of *Thrinax argentea* from Cuba is shown in Case 21 in entrance passage, and stems of *T. Miraguana*, H. B. K., and other species in Case under the stairs in exit passage.)

CASE 44.

TRIBE IV. *LEPIDOCARYEÆ*.—**No. 81.** Part of cable of Chinese junk, made of twisted stems of *Calamus rudentum*, Lour. The species of *Calamus* form slender climbing stems, often going to a great height or spreading far and wide in

CASE 44. the branches of surrounding trees, by means of their rapid growth and flexibility. The smaller stemmed species are generally known under the name of canes, and used for chair bottoms and similar purposes. Underneath the gallery which surrounds the room are arranged two stems of species of *Calamus*, one measures 369 feet long and goes round the gallery nearly four times, the smaller stem is 160 feet long. Observe cattle rope as used in Ceylon, made of the plaited stems of *C. rudentum*, also fruiting spadices of this species, as well as of *C. depressiusculus*, T. et B., *C. erectus*, Roxb., and *C. viminalis*, Willd.

TABLE CASE B. In this Case are various other illustrations of the genus *Calamus*, including paddy or rice plant basket of split stems of *C. pachystemonus*, Thw., from Ceylon; manure basket of split stems of *C. tenuis*, Roxb.; squeezer or press of *C. rudentum*, used in Ceylon by native practitioners to express oil from nuts and seeds; fisherman's basket and betel box of split stems of *C. Rotang*, L.; tray for winnowing corn of split stems of *C. latifolius*, Roxb., from India; pillow made of split rattan for summer use in North Formosa; rattan walking sticks, rough and finished, of various species of *Calamus*. A basket for holding bait made of stems of a species of *Calamus* is shown in Case 18, entrance passage.

Observe also MALACCA CANES (*Calamus scipionum*, Lour.), rough and finished. They are imported in large quantities from Siak, and are valued according to the length of their internodes, the longest being used for walking sticks and the shorter ones for the handles of chimney-sweepers' brushes, etc.

On the other side of this Table Case, nearest the entrance door, observe split rattan canes, as formerly used, instead of whalebone for ladies' dresses and bonnets, as well as for brushes, and, when dyed black, for the ribs of umbrellas.

Note also an undershirt and pair of cuffs made of very fine split rattan from Corea. They are worn next the skin to prevent the outer shirt clinging to the body in hot weather.

CASE 45. The upper part of this Case contains stems, spadices, and fruits of various species of *Calamus*, *Laccosperma* and *Dæmonorops*, including *Laccosperma opacum*, Mann and Wendl., from Fernando Po, *Dæmonorops Hystrix*, Mart., from Siam., *D. longipes*, Mart., from Java, *D. jenkinsianus*, Mart., from India, *D. periacanthus*, Miq., from Java, *D. fissus*, Blume, from Borneo, and *D. melanochætes*, Blume, var. *macrocarpus* from Java.

No. 82. Dragon's Blood, the resin obtained from the fruits of *Dæmonorops Draco*, Blume. This species grows in the swampy forests of Palembang and in the territory of Jambi, in Eastern Sumatra, as well as in Southern Borneo, from whence the dragon's blood of commerce is obtained. The plant is said to occur also in Penang and in various islands of the Sunda chain. The fruits which are about the size of a large cherry, covered with imbricated scales, become enveloped at maturity with a red brittle resin which incrusts them so abundantly that the scales can hardly be seen. It is readily removed by shaking or beating the fruits in a sack, after which it is sifted to remove any loose scales or other impurities, the resin is then softened by exposure to the heat of the sun or by placing it in boiling water, after which it is moulded into sticks or balls and wrapped in pieces of palm leaf. An inferior quality is prepared by boiling the pounded fruits in water and making the resin into a mass, often adding other substances by way of adulteration. Dragon's blood is chiefly used for colouring varnishes, and in medicine as a colouring agent to plasters and tooth powders. Various samples of the resin are shown as well as of the fruits incrusted with it. CASE 45.

The upper portion of the Case contains spadices and fruits of species of *Zalacca*. CASE 46.

No. 83. Buah Zalak. Fruits of *Zalacca edulis*, Reinw. They are eaten in the Island of Bally, raw, or salted and used at table with rice.

Note also fruits of *Z. wallichiana*, Mart., from Siam, and *Z. secunda*, Griff., from India.

No. 84. Spadices of *Plectocomia elongata*, Blume, a climbing spiny palm of Java, Malacca, Penang, &c. The leaves are very long, and the midrib extends at the end into a lengthened slender tail armed with strong, sharp, deflexed hooks, by which means the plant supports itself in the branches of the trees amongst which it climbs. It is said "that the tails of the leaves are very useful to the police in Java; two of them are tied to a long pole or handle, and used for catching a run-amuck Malay."

No. 85. Rajah Canes, rough and finished, the young slender stems of *Eugeissonia minor*, Becc. Large quantities of these sticks were at one time imported into this country from the East for the manufacture of walking sticks, but owing to their liability to split they are not so much used at

CASE 46. the present time. The name Rajah is said to be derived from the fact of the duties paid for its export being claimed by the Rajah of Borneo.

Note spadices of *Eugeissonia tristis*, Griff., from India and Borneo. The remainder of the genera belonging to this tribe are continued in Case 50.

CASE 47. TRIBE V. *BORASSEÆ.* In the upper and middle portions of the Case observe leaves and spadix, baskets, mats, scarves, &c., made of split leaves of the PALMYRA PALM (*Borassus flabelliformis*, L.), from West Africa. This palm is a native of Tropical Africa, but is widely cultivated in Tropical India and beyond the tropics in Bengal, and the southern part of the North-western Provinces. Observe specimen of the cuticle of the young leaves, as prepared on the Niger, for making hats, mats, &c.

No. 86. Fruits of *Borassus flabelliformis*, from the Niger River.

Note on bottom shelf young plants of this palm, eaten in this stage of growth as a vegetable by the Nupé people, Western Africa, as well as in Ceylon and India.

No. 87. Section of trunk of the BLACK RUN PALM (*B. flabelliformis*), from the Gambia.

CASE 48. In the upper part of this Case are exhibited male spadices and fruits of *Borassus flabelliformis*, and at the back of the Case is an expanded leaf of the same palm.

PALM KERNELS. The young seeds of the Palmyra palm, used as food in Siam, where it is known as the SUGAR PALM.

Observe gum from the tree; also silky hairs from young petioles, used as a styptic in Tinnivelly, and germinating seeds.

No. 88. WALKING STICKS in the rough and finished states, made of BLACK PALMYRA wood.

No. 89. Longitudinal and transverse sections of the trunk of the Palmyra.

CASE 49. In the centre of the upper portion of the Case note a Fisherman's Basket and a Sleeping Mat from Madras, made from Palmyra leaves; also umbrella of an entire leaf, from Timor Delli, and sample of fibre from the petioles of the palm used as a substitute for bass for making stiff brushes.

In the lower part of the Case, at the back, is an Indian umbrella and hat made from Palmyra leaves, and in Cases 18 and 22, in Room No. 2, other umbrellas of a more ornamental character, together with a fan from Burma, are shown.

CASE 49.

No. 90. Rough and Finished Walking Sticks of Red Palmyra (*Borassus flabelliformis*).

No. 91. Model of a Palmyra tree, illustrating the mode of collecting toddy.

No. 92. Fine bunch of fruits of Palmyra.

Note a portion of a trunk, cleaned and polished; also an Indian drum made of a hollow trunk of the same palm.

TABLE CASE C.

A large collection of baskets, hats, fans, &c., made from Palmyra leaves are here shown. Also a complete set of toddy collecting apparatus, consisting of knives used for cutting the spathes, wooden strop used to sharpen the knives, vessel for collecting the toddy by tying it to the end of the spathe, and allowing the juice to flow into it, rope for passing round the body of the toddyman, to assist him in climbing the trees, staves or bludgeons for beating the spathes, cases made of the spathes used for holding the instruments, shields or guards of leather, to prevent the wearing away of the rope by friction in climbing.

The principal product of the Palmyra tree in India is the sweet sap, which when collected and fermented forms toddy. Seemann says, "At the season when the inflorescence begins to appear, and before the spathes have had time to burst, the toddyman is at work in the palmyra groves." After cutting off some of the leaves, "All or most of the spathes are effectually encompassed from end to end by thongs, to prevent the inflorescence from bursting forth. Thus tied they are beaten and crushed between the wooden battens. This operation is repeated for three successive mornings, and on each of the following four a thin slice is cut from the points of the spathes; and this is done in order to keep them from bursting and to encourage the flow of sap. On the eighth morning a clear sweet liquor begins to flow from the wounded parts . . . . . . The toddy drawer ascends again with chatties, or toddy receivers, in which he places the ends of the spathes, and leaves them until the evening, when they are found to contain a quantity of this liquor. The operation of extracting the juice is repeated every morning and evening, or in the mornings only, until the whole spathe is sliced away. The trees are drained in this manner for several months in the year, but it is said that if the operation is repeated on the

TABLE CASE C. same tree three successive years, without allowing any of the spathes to burst, the tree dies."

Toddy is very largely used as a beverage, or distilled into arrack, but by far the greatest quantity is boiled down for jaggery, or sugar, specimens of which are exhibited.

Note Hindoo and Siamese books made of strips of PALMYRA leaves, closely packed together, also an iron stylus such as is used for writing.

Observe leaf of *Borassus flabelliformis*, from which the natives of Timor Laut make a strong thread, used in weaving. Samples of the woven fabric and apparatus used in weaving are also shown.

Suspended under the skylight in the centre of this room, observe a DUG-OUT, or INDIAN CANOE, made of a trunk of a Palmyra palm, the central portion of which has been scraped out.

The remainder of the genera belonging to this tribe are continued in Case 54.

CASE 50. TRIBE IV. *LEPIDOCARYEÆ* (continued from Case 46).

In the upper division of this Case note scarves from West Africa, made of the cuticle of the young leaves of *Raphia* species. Also fibre, as prepared for making the scarves, and fruits of undetermined species of *Raphia* from East and West Africa.

The middle division contains specimens of cloth made from thread of the twisted cuticle of the leaves of *Raphia Ruffia*, Mart., from Madagascar. Various designs and qualities are exhibited. Note a mat made of the split leaves of the same palm.

No. 93. RAFFIA, the cuticle of the leaves of this palm, much used in gardens for tying plants.

No. 94. Bunch of fruits of *Raphia Ruffia*, grown in Mauritius.

Fine fruiting spadices of this palm are shown in Case 52, and also in Cases 17, 18, and 19, in Room No. 2.

No. 95. Coarse cloth made from split leaves of the *Raphia* palm, the universal clothing of the Malagasy slaves.

No. 96. Native cloth, called LAMBA. Made from leaves of *Raphia* sp., from Manyima, west of Tanganyika, on the Upper Congo.

CASE 50. Observe portions of spadix with fruits, of *R. longiflora*, Mann and Wendl., and *R. Gærtneri*, Mann and Wendl., &c., from West Africa.

A spadix of the latter from the Gold Coast is shown in Case No. 18, in Room No. 2.

CASE 51. Along the upper part of this Case note Yoke for carrying loads, made of a petiole of the Bamboo Palm (*Raphia vinifera*, Beauv.), from West Africa.

No. 97. Native Loom made of petioles of the same palm, from the Gold Coast. Note also models of fish trap and shrimp basket made of the same from Lagos, and various other baskets of different designs and patterns from West Africa.

In the middle portion of the Case observe fruits of *Raphia vinifera*, Beauv., and *R. Hookeri*, Mann and Wendl., and in the lower portion of the Case note portion of petiole or leaf-stalk of *R. vinifera*, and bundle of fibre extracted from it. It is imported into England for brush making and is known as Lagos Bass. (See *Kew Bulletin*, 1891, p. 1–5).

Fine spadices of both of these species are shown in Case 52, and one of *R. vinifera* is also exhibited in Case 19, Room No. 2.

On the left-hand side of the mantel-piece, in the centre of the room, observe a Fishing Net made of strips of leaf stalks of the Jupati palm (*Raphia tædigera*, Mart.) from Caupi, Rio Para.

No. 98. Fruits of the Fijian sago palm (*Metroxylon vitiense*, Wendl.), and sago made from the palm.

No. 99. Fruits of *Metroxylon amicarum*, Wendl. From the Friendly and Solomon Islands. They are hard like ivory, and have been called Ivory nuts.

Observe also sago prepared from the palm.

No. 100. Spadices with fruits of the Sago palm (*Metroxylon Sagu*, Rottb.), a tree some 40 or 50 feet high, with a straight cylindrical trunk from one to two feet in diameter. It is abundant in damp situations in Sumatra and the neighbouring islands, as well as in Java, Borneo, Celebes, Siam and Malacca, and it is also cultivated in the Moluccas.

The life of the plant extends to 15 or 20 years, at which period it flowers, and the tree then dies; very few fruits are perfected, and they occupy from two to three years in ripening. To obtain sago, the tree is felled at the time of its growth when the medullary matter is fully developed, before the

CASE 51. appearance of the fruit. The trunk is cut into pieces six or seven feet long, and these are split into two. The medullary matter is then extracted and reduced to a coarse powder, which is mixed with water and strained through a sieve. The water containing the starch in suspension is then allowed to stand until the insoluble fecula is deposited, when the water is poured off and the remaining starch thoroughly washed and afterwards dried, when it forms what is known as sago meal. To prepare the granulated sago of the shops, the meal is mixed with water into a paste and then rubbed through sieves to cause the granulation, after which it is dried in the open air or in ovens, when the grain becomes hard and translucent; granulated sago is made in different sizes and is known in commerce as pearl sago, or common brown or Borneo sago, and is imported to this country chiefly from Singapore and Sumatra to the extent of about 4,000 tons annually. Sago is an easily digested and nutritive article of food.

Sago meal of different qualities, prepared sago, and sago flour and starch are exhibited, also sago bread from Amboyna and from the island of Saporoa.

No. 101. SAGO CAKES from Ceram, the staple food in the Eastern Moluccas. Four cakes are said to be sufficient for a day's food. They are sold at about 10 shillings per thousand.

CASE 52. This Case contains large spadices of different species of *Raphia* described in their classified Order, a fine spadix of *Ancistrophyllum secundiflorum*, Mann and Wendl., from West Africa, and a specimen of thatch made of leaves of the BAMBOO PALM (*Raphia vinifera*) used for roofing houses at Fernando Po.

CASE 53. Observe leaves, spadix, and fruits of *Eremospatha macrocarpa*, Mann and Wendl., from the River Niger.

No. 102. Spadix of the ITA or ÆTA palm (*Mauritia flexuosa*, L. fil.), from British Guiana.

No. 103. Sail for Indian Canoe made of central portions of the leaf stalks of *Mauritia flexuosa*, L. fil., from British Guiana.

Observe section of trunk of Ita Palm from Para also fans and baskets made in British Guiana of the split petioles. Note also mounted specimens of the fruits, and sandals made from the leaf stalk used by Macusi Indians in stony parts of the Savannahs in British Guiana.

CASE 53.

A photograph of a group of these palms is exhibited in this case.

No. 104. Fruiting spadices of the Carana Palm (*Mauritia aculeata*, Humb.), from Santarem.

No. 105. Section of trunk of Wine Palm of Para, (*Mauritia vinifera*, Mart.), a tall, graceful palm with a cylindrical trunk, from which a juice or kind of wine is obtained by cutting down the tree and cutting into the trunk several holes about six inches square, three deep, and about six feet apart. In a short time these holes become filled with a reddish coloured liquid which forms a very agreeable drink. On the Rio Negro the hard outside portions of the trunk are used for building purposes.

No. 106. Fruits of *Mauritia vinifera*. Between the outer scales and the hard central part, a reddish coloured pulp is formed "which the inhabitants of Crato boil with sugar and make into a sweetmeat; in Piauhy they prepare from this pulp an emulsion which, when sweetened with sugar, forms a very palatable beverage, but if much used is said to tinge the skin of a yellowish colour."

TABLE CASE D.

In the Table Case in front of Case 54, observe hammocks and mats made from the young leaves and cuticle of the leaves of the Muriti Palm (*Mauritia vinifera*), from Brazil.

CASE 54.

No. 107. Tibisiri Fibre, the cuticle from the young leaves of *Mauritia flexuosa*, L. fil. It is very strong and durable, and is used in British Guiana for making hammocks, specimens of which are shown; also twine or cord made of the twisted leaves.

Tribe V. *Borasseæ*, continued from Table Case C.—**No. 108.** Sections of fruits of Coco de Mer, or Double Cocoa Nut (*Lodoicea sechellarum*, Lab.). A palm from 50 to 100 feet high, native only of the Seychelles, and more especially abundant in Praslin. Before the discovery of these islands, the large and curious fruits were occasionally found floating in the Indian Ocean, and from the mystery attached to their origin very large sums were frequently paid for them.

Observe walking sticks made of the wood.

No. 109. Sections of lower part of trunk of Coco de Mer; note also specimens of the hardwood from the outside of the trunk.

TABLE CASE D. In this Case are exhibited perfect fruits enclosed in the dried fibrous husk-like coating; also a model of a fruit, and a series of fruits with the husks removed, showing the usual two-lobed or double form, and three, four, five, and six lobed forms. Observe also germinating fruits and fine male spadices. The latter sometimes grow to ten feet long. The shells of the Coco de Mer are very hard, like those of the ordinary cocoa-nut, but thicker and are often carved, and used for water vessels and similar purposes; a very fine example is shown in this Case. It is an Indian Fakir's drinking cup; the three lines encircling it are lines and sentences from the Koran, in Arabic. Initials and the date 1861 are also carved on the shell, likewise in Arabic; and the rest is profusely ornamented.

The other side of the Table Case is devoted to various useful and ornamental articles, such as baskets, fans, hats, &c., made in the Seychelles from the dried leaves of the palm. A series of drawings, some of them by General Gordon, is shown on the wall of the entrance passage. Other illustrations of this palm are shown in Museum No. III. (See also *North Gallery*, **Nos. 474, 477.**)

CASE 55. In the upper division of this Case are spadices of *Latania Commersonii*, Gmel, a palm of Mauritius growing to a height of about 40 feet. Observe also a specimen of fibre from this palm.

In the same division of the Case are exhibited fruits of *Latania Loddigesii*, Mart., a tall palm from Round Island.

In the central portion of the Case are male and female spadices, and fruits of *Latania Verschaffeltii*, Lemaire. A palm 40 feet high, native of Rodrigues. Note also a portion of a trunk, and a walking stick made of the beautifully marked wood.

The lower portion of the Case is devoted to strainers, spoons, mats, and a hat made in Natal from the leaves of a species of *Hyphæne* (probably *H. crinita*, Gaert.). Fruits of other species are exhibited from Tropical Africa.

CASE 56. **No. 110.** Portion of a forked stem of the DOUM PALM of Egypt (*Hyphæne thebaica*, Mart.), exceptional in the Palm Order from its normally branching trunk.

No. 111. Fine bunch, or spadix of fruits of *Hyphæne thebaica*. The thick fleshy-fibrous part of the fruit resembles gingerbread both in colour and taste, hence the palm is often known as the GINGERBREAD TREE.

No. 112. Fruiting spadix of *Hyphæne coriacea*, Gaertn., from Central Africa. CASE 56.

Note swinging trays used for carrying baskets in South-eastern Tropical Africa, made of leaves of *H. crinita*, Gaertn. Fruits of this species are also shown.

No. 113. Drawing, illustrating the mode of collecting palm wine from *Hyphæne* (probably *H. crinita*), on the Zambesi.

Observe also a cover made of the leaves of the same palm, used for protecting the wounded trunk during the collection of the juice.

The lower portion of the Case contains mounted specimens of fruits of *H. thebaica*, *H. coriacea*, and *H. crinita*. Also fruits of *H. Argun*, Mart., from the Nubian desert.

TRIBE VI. *COCOINEÆ*.—**No. 114.** Ornamental hammock made at Tomo, on the Guiania, Brazil, from the cuticle of the young leaves of the TUCUM palm (*Astrocaryum vulgare*, Mart.). The palm grows to a height of from forty to fifty feet, with a straight trunk six or eight inches in diameter, covered with rings of thickly set black spines very closely set together, indeed all parts of the palm bristle with sharp spines. It is found on the forest land of the Amazon and Rio Negro, and the only part of it used is the young unexpanded leaves, the cuticle of which, when twisted, furnishes cordage of extreme fineness, combined with great strength and durability. Some of the tribes on the Upper Amazon are said to make all their hammocks of this fibre. Wallace, in his *Palms of the Amazons* says, "the Brazilians of the Rio Negro and Upper Amazon make very beautiful hammocks of fine 'tucúm' thread, knitted by hand into a compact web of so fine a texture as to occupy two persons three or four months in their completion. They then sell at about 3*l.* each, and when ornamented with the feather work borders, at double that sum. Most of them are sent as presents to Rio de Janeiro." CASE 57.

No. 115. Sample of the cuticle from the young leaves, torn into strips, and used for making cordage. From the Rio Negro.

Observe Indian bellows made of strips of leaf stalks of the Tucum palm, from the Rio Uaupes.

No. 116. Neck ornament from the river Amazon, worn by chiefs, made of a piece of quartz cut into a cylindrical form.

CASE 57. The hole by which it is suspended is bored by means of slender strips of the skin of the stem of a species of *Alpinia*, twisted rapidly between the palms of the hands, with the addition of a little fine sand. It is said to be the work of weeks to bore one of them. The string is made of the fibre of the Tucum palm, and the seeds are those of a gourd.

Note Birros or needles used on the Amazon in making cushion lace. The knobs are the fruits of the Tucum palm scraped and polished. A pipe is also exhibited from British Guiana, the bowl of which is made from the hollowed fruit of the same palm.

On the bottom shelf observe a box made of the leaves of the Uauassu palm, (*Attalea* sp.), crossed with Tucum string, from the Rio Uaupes.

Room No. 5

CASE 58. In the upper part of this Case are exhibited male and female spadices and portions of stems of various species of *Astrocaryum*, chiefly from Brazil, including *A. aculeatum*, Mey., *A. Tucuma*, Mart., *A. Ayri*, Mart., *A. gyuacanthum*, Mart., and *A. acaule*, Mart.

Note the hard bony fruits of several species of *Astrocaryum*, and photographs of young Aroacooshi palms (*A. gynacanthum*, Mart., var. *munbacea*), at Pomeroon, British Guiana, and a group of Awarra palms (*A. tucumoides*, Drude), at Maccasseema, British Guiana.

On the middle shelf observe Basket made by the Indians on Rio Tapajoz, Amazon, from the leaves of the Tucuma palm (*Astrocaryum Tucuma*, Mart.). In the lower division note hat made of the same leaves, from British Guiana.

Note also fans made of the leaves of the Awarra palm (*Astrocaryum tucumcides*, Drude). Used by the Indians of British Guiana to blow their fires.

Observe in lower division a large open-work mat made in Cayenne, from the same leaves.

No. 117. Portion of stem of Gri Gri palm of Trinidad (*Astrocaryum aculeatum*, Mey.). Observe walking sticks in the rough and finished states, made probably of the saplings of *Astrocaryum aculeatum*, imported in large quantities from the West Indies under the name of Gri Gri.

CASE 59. This Case is filled chiefly with spadices, stems, and fruits of various species of *Bactris*, including *B. Maraja*, Mart., *B. leucantha*, Wendl., *B. concinna*, Mart., *B. trichospatha*, Trail., *B. plumieriana*, Mart., *B. bidentula*, Spruce, *B. balanophora*, Spruce, *B. riparia*, Mart., &c., &c. CASE 59.

No. 118. Fruits of the PUPÚNHA or PEACH PALM *Bactris minor*, Jacq. (Guilielma speciosa, *Mart.*). This is a palm of elegant habit, growing to a height of 60 feet, with a perfectly erect, slender trunk, covered with rings or bands of long needle-like spines. The palm is indigenous to the countries near the Andes. The fruit is usually about the size of an apricot, of a triangular oval shape, and of a reddish yellow colour. It is mostly abortive, not developing its seed, and becomes a farinaceous mass. The fruits which do develop their seeds are nearly double the usual size. In the villages the trees are often planted in large numbers for the sake of the fruits which form an abundant and wholesome food. Wallace says, "As the stems are so spiny, it is impossible to climb up them to procure the fruit in the ordinary way. The Indians therefore construct rough stages up the sides of the trees, or form rude ladders, by securing cross pieces between two of them, by which they mount so high as to be able to pull down the bunches of fruit with hooked poles." The fruits are eaten boiled or roasted, and are said to have a flavour of chestnuts with a slightly oily taste. Ground into flour they are made into cakes, or fermented in water they form a sub-acid creamy liquid. The sharp spines are used by the natives for puncturing the skin for the purpose of tattooing. The wood is of a very dark colour and extremely hard. A specimen from Trinidad is shown on a lower shelf.

Observe photograph of a clump of Peach Palms (*B. minor*) from British Guiana.

Note in lower part of Case portion of a spathe of the GREAT MACAW PALM (*Acrocomia lasiospatha*, Mart.), used in Jamaica as a cap and as a strainer for cassava.

No. 119. Fruits of the GRU GRU or MACAW PALM (*Acrocomia sclerocarpa*, Mart.), from Bahia. The tree grows from 20 to 30 feet high, and is found in Jamaica, Grenada, Trinidad, Guiana, and Brazil. The nut is very hard, and is sometimes carved by the people.

In the upper division of the Case are spadices of *Acrocomia sclerocarpa*, also of species of *Martinezia*, and fruits of *M. caryotæfolia*, Humb. & Kunth. CASE 60.

No. 120. Beads, such as are used in Western and Southern Africa to barter for palm oil and other African produce.

CASE 61. In the upper part of the Case are shown male spadices and fruits of the AFRICAN OIL PALM (*Elæis guineensis*, Jacq.).

The palm has a thick decumbent trunk crowned with a tuft of large pinnate leaves, with strong prickly stalks. The female spadices are very large, and are crowded with fleshy fruits about the size of a large olive, and of an orange-yellow colour, from which the oil is extracted. The tree is very abundant in Western Tropical Africa.

Note Whisks from Fernando Po and Gambia, made of the midribs of the leaves of the Oil Palm, and used by the people to keep insects from the body.

Also series showing progressive stages in the preparation of fibre and the manufacture of cordage from the leaflets of the Oil Palm in Lagos. (See *Kew Bulletin* 1892, p. 62.)

Seeds and kernels of the Oil Palm are also shown, and specimens of oil cake for feeding cattle, made from ground palm kernels.

No. 121. Samples of PALM OIL of different qualities. 1. Used for cooking purposes in Gambia. 2. Used medicinally in Gambia. 3. Oil obtained from palm kernels. Samples of crude palm oil of an orange-red colour, as imported for candle and soap making, are also exhibited. It is obtained from the pulp of the fruits in Africa by boiling them in water and skimming off the oil as it rises to the surface. As imported palm oil is usually about the consistence of butter, of an orange-red colour, with a sweet violet odour when fresh. 1,169,943 cwts. of palm oil were imported to this country in 1893.

No. 122. SOAP made from Palm Kernel Oil.

No. 123. PALMITIC ACID CANDLES.

No. 124. GLYCERINE, a bye-product of candle and soap making, from palm oil. It was at first thrown away as a waste product. At the present time it is applied to a large number of uses in the arts and sciences.

No. 125. Palm oil products, the results of the process of candle-making by Messrs. Price & Co.

Some fine fruit-bearing spadices are shown in the lower part of the Table Case, immediately opposite ; also a wooden mortar used at Sierra Leone for pounding the seeds for the extraction of the oil, and a glass jar or vase lined on the inside with a deposit of palmitic acid.

Continued on the lower shelf of Case 61, observe fruits of *Elæis melanococca*, Gaert. A palm of Central America, a spadix of which is shown in the lower portion of the Table Case opposite. CASE 61.

Observe NOLI, or scurf scraped from the leaf-stalk of *E. melanococca*, used as tinder in New Grenada.

Note also fruits of *Diplothemium caudescens*, Mart., and *D. maritimum*, Mart.

No. 126. Fruits of the COHUNE Palm (*Attalea Cohune*, Mart.), a native of Honduras and Guiana. The fruits are about the size of a large hen's egg, and grow in clusters. The kernel, when fresh, is said to have a flavour similar to that of the cocoa nut, but more oleaginous. This oil is sometimes expressed in British Honduras and used for illuminating purposes. A sample of the oil is shown.

Note fruits of CURUÁ PALM (*Attalea spectabilis*, Mart.), a stemless palm of the Rio Negro, the leaves of which are used for thatching.

No. 127. COQUILLA NUTS, the hard, bony fruits of *Attalea funifera*, Mart., a Brazilian Palm, growing to a height of from 20 to 30 feet, with very large and rigid leaves, the bases of the petioles of which are sheathed in coarse fibre, which forms some of the Piassaba or Bass of commerce. Coquilla nuts are of a dark brown colour, sometimes mottled, and are extremely hard, taking a high polish. They are largely used for turnery work, as well as for knobs for drawers, bell-pulls, toys, &c. Some rosaries made from beads carved from Coquilla nuts, humming tops, carved boxes, and bracelets, are also shown.

In the upper part of this Case is a spadix of *A. funifera*, from Bahia, and also an opened spathe. CASE 62.

No. 128. Portion of a base of a small stem of *A. funifera*, showing the strong fibrous bases of the leaves which, when removed and cleaned, constitute Bahia Piassaba. (See *Kew Bulletin*, 1889, pp. 237–242.)

No. 129. Portion of a fibrous sheath as taken from the trunk, opened to show the fibre.

No. 130. BASS or PIASSABA Fibre as imported.

No. 131. Fibre prepared or dressed for broom making.

No. 132. Finished Bass brooms or brushes.

CASE 62. Observe fruits of *Attalea excelsa*, Mart., the Urucuri Palm of the Lower Amazon. Used for burning to produce smoke to dry and blacken india-rubber in process of coagulation.

On the bottom shelf are seeds of the Chilian or Coquito Nut Palm (*Jubæa spectabilis*, H.B.K.). They are nearly round, and are about the size of marbles, for which indeed they are used by the boys of the country; the kernels are eaten, and are also made into various kinds of confectionery. They have been imported at various times into this country as an edible nut. A syrup is extracted from the trunk known as Miel de Palma, or Palm Honey. A good tree, it is said, will yield as much as 90 gallons of sap, which is concentrated by boiling into the thickness of treacle. A photograph and a drawing of the tree are shown. A fine specimen grows in the Temperate House.

CASE 63. This Case, together with those numbered 64, 65, and 66, is devoted to the exhibition of the various economic products of the Cocoa-nut (*Cocos nucifera*, L.). This Palm is very widely spread by cultivation near the sea coast in most tropical countries; it grows to a height of from 60 to 100 feet, with a cylindrical trunk from 1 to 2 feet in diameter, crowned with a number of waving feathery leaves. The Cocoa-nut is the most important of all the Palms on account of the many and widespread uses to which it is put, the two most valuable products in a commercial sense being the dried kernel or copra from which oil is expressed, and the strong fibrous husk which covers the nut and is much used for matting and brush making as well as for ropes.

In the upper part of Case 63 observe hammock made of Cocoa-nut fibre, also spadices and spathes of the Palm from Jamaica, a war dress from Tahiti, a mat from Calcutta, broom from China, and various kinds of rope and cordage made from Cocoa-nut fibre.

CASE 64. Specimens of Coir or Cocoa-nut fibre cables are here shown from India and Burma, and mats from Madras made of the plaited leaves.

CASE 65. Note portions of the fibrous sheathing base of the petioles used in Formosa for the soles of shoes, and in Bahamas as a strainer.

No. 133. Bunch of Cocoa-nuts as grown; sometimes as many as from twelve to twenty large nuts are produced on one bunch.

Note photographs of Cocoa-nut Palms, also specimen of COCOA-NUT JAGGERY or sugar from Madras. It is prepared by boiling down the toddy, which is obtained in large quantities from the unopened spathe. CASE 65.

No. 134. Model of a 'BURE NI KALOU,' or temple, made of Cocoa-nut fibre from the Fiji Islands.

No. 135. Portion of a trunk of a Cocoa-nut Palm from Trinidad. The wood is known as PORCUPINE WOOD, and is used for ornamental purposes and for making walking sticks, specimens of which are exhibited.

A branched stem of a Cocoa-nut tree from Fiji is shown in this Case.

Along the top of this Case is a broom made of Cocoa-nut leaves, from Dominica, and at the back observe fans from Samoa made of plaited leaves, also a broom as used in Ceylon, made of the midribs of the leaflets and a brush of the same, used in Fiji for cleaning flues. CASE 66.

No. 136. Samples of ARRACK and VINEGAR made from Cocoa-nut toddy, from Ceylon. Observe sliced Cocoa-nut kernel, used as an article of food in Siam.

No. 137. COCOA-NUTS and wax models showing process of germination.

No. 138. COCOA-NUT PEARL from the perisperm of the Cocoa-nut, used by the natives in North Celebes as a charm against evil spirits.

No. 139. EXPRESSED OIL OF COCOA-NUT. Specimens are shown of stearine and oleine separated by pressure, also composite candles made of a mixture of stearic acid, palm oil and stearine of Cocoa-nut oil. 155,347 cwts. of Cocoa-nut oil were imported into this country in 1893.

Note on bottom shelf fine spadices in fluid of Cocoa-nut Palm. Also plume for a head dress made of the cuticle of the young leaves from Otaheite.

A few fruits of other species of *Cocos* are shown in the lower part of this Case; amongst them are the following: *Cocos p mosa*, Lodd., *C. campestris*, Mart., *C. coronata*, Mart., &c., &

A Robe from Tahiti made of Tapa Cloth (*Broussonetia p pyrifera*), and ornamented with the cuticle from the young l ves of the Cocoa-nut Palm dyed blue, is shown in a special C se over the fireplace in Room No. 4.]

TABLE CASE.

TABLE CASE.

The top of the Table Case in the centre of the room is devoted to further illustrations of the products of the Cocoa-nut Palm. On the side next the windows, and commencing at the end nearest Case 66, note a bird cage from Singapore, made of the split petioles of the Palm; also a toy ship, made of a portion of the husk of a Cocoa-nut, with sail consisting of the leaf of a *Ficus*, used by children in Seychelles to float in shallow water. Cocoa-nut scraper and rasp from Straits Settlements; water vessels and spoons of Cocoa-nut shells; fishing lines from Samoa of Cocoa-nut fibre; series showing the manner of collecting and preparing Cocoa-nut fibre or Coir. The husk or fibrous portions of the fruits are shown from Belize, Trinidad, and Ceylon; also portions of husk showing fibre partially combed; fibre prepared for mat making and sorted into lengths ready for brush making. Note samples of prepared fibre from Cochin, Ceylon, and Fiji, the first being of a very light colour, the second medium, and the third dark brown. A mat made by Messrs. Treloar & Sons from these undyed fibres is also shown.

On the opposite side of the Table Case, in front of the door, is a series of Cocoa-nuts in the husks and with the husks removed, from different countries and of various sizes and forms. Observe the small KING COCOA-NUTS, from Ceylon; also COPRA, the dried sliced kernel from which the oil is expressed. Abnormal Cocoa-nut, the peculiar growth of which is due to a hypertrophied condition of the segments of the perianth, which have increased in length and developed the fibrous structure of the pericarp; COCOA-NUT CAKE, the residue of the kernel after expressing the oil, used for feeding cattle; Cocoa-nut oil soap from Madras; Cocoa-nut shells, many of them highly carved and polished and made into useful and ornamental articles, as tea pots, tea cups, tobacco jars, winecups, ladles, &c.

CASE 67.

No. 140. Male and female spadices and spathes of the KOKERITE PALM, *Maximiliana martiana*, Karst. (M. regia, *Mart.*), from Demerara. This magnificent palm forms a lofty smooth trunk, covered with large, terminal, pinnate leaves, sometimes 50 feet long; the petioles are persistent for some distance down the trunk. The palm produces numerous spadices from amongst the bases of the lower leaves. The spathes which enclose the spadices grow to a very large size, as may be seen from the specimens exhibited. This palm is abundant from Para to the Upper Amazon, and the sources of the Rio Negro. The fruits, of which specimens are shown, are somewhat oval-shaped, covered with a brown outer skin, which encloses a fleshy pulp said to have a pleasant sub-acid flavour; in the centre is a hard, bony seed. CASE 67.

Observe photographs of KOKERITE palms, from Maccaseema, British Guiana.

Note also in the lower portion of the Case, rough and finished PARTRIDGE CANES, the stems of an unknown palm largely imported from China, for making walking sticks and ladies' sunshade handles.

A few palm products, the exact sources of which cannot as yet be determined, are shown in the bottom of this Case and on the top shelf of Case 68.

Screw Pine Order (*Pandaneæ*). A small group of Palm-like trees and shrubs, remarkable for their branching candelabrum-like stems and the aerial roots given off from the trunk far above the ground. They are natives of the tropical regions of the Old World. The Order contains only two genera, *Pandanus* and *Freycinetia.* CASE 68.

No. 141. Fruit-head and portion of stem of *Pandanus Eydouxia*, Balf. fil.; native of Mauritius.

The fruit-heads of the following species are also exhibited in this Case: *P. drupacea*, Pet. Th., Mauritius; *P. pyramidalis*, Barkly MSS., Mauritius; *P. sechellarum*, Balf. fil., Seychelles; *P. conoideus*, Pet. Th., Mauritius; *P. Hornei*, Balf. fil., Seychelles; *P. palustris*, Pet. Th., Mauritius; *P. candelabrum*, Beauv., Cameroon Mountains, West Africa; *P. microcarpus*, Balf. fil., Mauritius; *P. Barklyi*, Balf. fil., Mauritius; and *P. utilis*, Bory., a native of Madagascar, but commonly planted in Mauritius for the sake of its leaves, which are largely used for making sugar bags. A sample of fibre prepared from old sugar bags, and rope made from the fibre, are shown.

No. 142. Baskets, fans, and mats made of the leaves of *P. caricosus*, Sprengel, from Fiji.

Note fruit-heads of *P. caricosus*, and of *P. fœtidus*, I xb., the latter from India. Note also fruit-heads of *P. Leram*, J nes, from Nicobar, where it is known as BREAD FRUIT. T ie fibrous portions of the drupes are combed out into a brush-li e form, and used for removing dirt from the feet. CASE 69.

CASE 69.

No. 143. Walking sticks of the wood of *P. spiralis*, Miq., from Brisbane.

Observe fruit-heads of *P. odoratissimus*, Lin. fil., a native of Tropical Asia, but common in Seychelles, and found also in Mauritius.

Fibre from the leaves of this species is shown, together with cordage made from the fibre. Also paper stock, and paper made from the leaves in India, and oil prepared from the flowers known as KEWRA or KEORA oil.

The lower division of this Case contains a collection of fruit-heads and seeds of various species of *Pandanus* at present undetermined.

TABLE CASE.

In the lower part of the Table Case opposite the door, observe baskets of various kinds made of leaves of *P. odoratissimus*, from Ceylon. Also large fruit-heads of *P. conoideus*, from Mauritius, and *P. candelabrum*, from Fernando Po.

On the opposite side of the Case, facing the windows, will be found fruit-heads of several species of *Pandanus*. Amongst others: *P. heterocarpus*, Balf. fil., from Rodrigues; *P. multispicatus*, Balf. fil., Seychelles; *P. purpurascens*, Pet. Th., Réunion; *P. furcatus*, Roxb., India; *P. tenuifolius*, Balf. fil., Rodrigues; *P. Vandermeeschii*, Balf. fil., Mauritius; *P. sphæroideus*, Pet. Th., Mauritius.

Note portions of fruit of an unnamed species of *Pandanus*, used for scrubbing brushes in Burma.

ROOM NO. 6.

CASE 70.

No. 144. Mat of very fine workmanship, made in Borneo from the leaves of a species of *Pandanus*.

Near this are plain and ornamental sleeping mats, made in Java, from leaves of *P. amaryllifolius*, Roxb. (P. latifolius, *Rumph*).

Note portion of stem, cones and drawing of plant of *P. labyrinthicus*, Kurz, from Sumatra and Java.

In the lower part of the Case are stems of *P. odoratissimus*, Lin. fil.

CASE 71.

No. 145. Chair mats, made in Ceylon, of leaves of *P. humilis*, Rumph.

No. 146. Ornamental mat, from Siam, made of leaves of *P. Houlletii*, Carr.

Note also Betel boxes and ornamental sleeping mat, from Java and Ceylon, made of the same leaves.

CASE 72. In the upper part of the Case is a native dress from Polynesia, made of the leaves of a species of *Pandanus* or *Freycinetia*.

Observe double sleeping mat, made of the leaves of *P. odoratissimus*, together with a bundle of the leaves from Madras. Also a sleeping mat of the same material from Kandy.

A mat made of the leaves of the KIE KIE (*Freycinetia Banksii*, A. Cunn.), from New Zealand, is also shown.

On the walls of the staircase which we now ascend are exhibited drawings as follows:—Spathe of *Dracontium gigas*, Engel. Diagram of the genus *Pandanus*. A jungle scene, with Pandanus and climbers in Eastern Africa. One of Prof. Henslow's Botanical diagrams illustrating the Natural Orders Orchideæ, Irideæ, and Amaryllideæ. Photograph of *Amorphophallus titanum*, Becc., which flowered in the Victoria House, Kew, in 1889.

On the landing are four photographic views in the neighbourhood of Calcutta, showing trees of PALMYRA (*Borassus flabelliformis*, L.), DATE PALMS (*Phœnix dactylifera* L.), &c.

ROOM NO. 7.

CASE 73. **Cyclanthus Order** (*Cyclanthaceæ*). A small group of stemless or caulescent plants, often climbing by means of adventitious epiphytic roots. They are natives exclusively of Tropical America.

The most important economic plant in the Order is *Carludovica palmata*, R. & P., a native of the shady, damp forests of New Grenada, Ecuador, and Peru. The leaves are fan-shaped, and are borne at the end of long, slender stalks; they are gathered in a very young state, almost before they begin to assume a green tint, and are cut into extremely narrow strips, after which they are steeped successively in boiling water, then in water acidulated with lemon juice, and finally in cold water, and allowed to dry, when the bleaching is perfected. In drying the edges of the strips curl inwards, so giving it a cylindrical appearance, and making it appear solid, though at the same time it is very soft and pliable. When thus prepared it is known as straw, and is used for making the well-known Panama Hats. These hats vary considerably in price, according to the fineness of the tissue, and the care exercised in the plaiting, the cheapest being sold for about 1*s*. 6*d*., and the very best fetching over 20*l*. Specimens of the prepared leaves are shown also.

CASE 73. **No. 147.** Panama Hat made of split leaves of *Carludovica palmata.*

Observe cigar case made of the same material, known as JIPIJAPA in Panama.

Specimens are also shown of the prepared leaves of *C. rotundifolia*, Wendl., used to make hats by the negroes of Jamaica. The "ribs" of the leaves, after the removal of the straw, are sometimes used for making brooms.

In the Table Case opposite is a QUAKE or Indian Basket made of the petioles of the MAMOURIE of British Guiana (*Carludovica rotundifolia*).

Bulrush Order (*Typhaceæ*). A group of marsh plants with long, narrow leaves and spiked or clustered flowers, widely distributed over the globe, especially in temperate regions.

No. 148. Bundle of leaves of BULRUSH or REED MACE (*Typha latifolia*, L.), used for making chair bottoms, hassocks, mats, baskets, &c., specimens of which are shown.

Note pollen of *T. angustifolia*, L., and cakes made from it, from New Zealand.

Observe down from the flower spikes of *T. angustifolia*, used in Victoria, Australia, for stuffing beds, cushions, &c.

In the lower compartment note mats made of the culms of *Typha elephantina*, Roxb., from Calcutta and Madras, also a bundle of the culms as prepared for making the mats.

CASE 74. **Arum Order** (*Aroideæ*). Mostly herbaceous plants, but sometimes caulescent, with straight, branched and arborescent stems, or climbing by means of adventitious roots. They are found chiefly in tropical countries both in the New and Old Worlds. The properties of the Order are acrid and poisonous, but few of the plants have any economic uses. On upper shelf note roots of NATU-ATI-VADAYAM (*Cryptocoryne spiralis*, Fisch.), imported occasionally into the London market as INDIAN IPECACUANHA.

Observe also tubers of *Pinellia tuberifera*, Ten., under the name of SANG-PWAN-HEA; they are sold in Chinese shops for use in medicine.

No. 149. Tubers of *Arum italicum*, Miller. The plant, which is a native of this country, is cultivated in the Channel Islands for the sake of the arrowroot obtained from the tubers.

Observe sliced roots of the CUCKOO-PINT (*Arum maculatum*, L.), a well-known roadside plant; the roots or tubers yield a quantity of starch known as PORTLAND ARROWROOT, a sample of which is shown. CASE 74.

Note a flower spathe of *Amorphophallus titanum*, Becc., of Sumatra, and photographs of the plant as it appeared in the Royal Gardens, Kew, June 1889. Also a spathe, preserved in spirit of *Amorphophallus Rivieri*, Durieu, from Cochin China. Note also tubers of this plant from Japan, where they are known under the name of KON-NI-YAK-DAMA, and the starch obtained from them is used as food. Cakes made from the starch are exhibited.

A model is also shown of a tuber of *Amorphophallus campanulatus*, Blume, an Indian plant, the tubers of which contain a large quantity of starch, and are cultivated as an article of food, being eaten like yams.

No. 150. WHITE COCO BISCUITS, the sliced tubers of *Colocasia antiquorum*, Schott, also starch prepared from the same; and RED COCO BISCUITS, from the tubers of a variety of *C. antiquorum*, together with meal and starch prepared from them in Jamaica. Samples of fibre of this plant from the Botanic Garden, Mauritius, and dry stems used as food in Japan, are also shown. The roots are generally known under the names of TARO, EDDOES, and COCOES, and are largely used for food in India and other warm countries.

On the bottom shelf note basket made of aerial roots of *Monstera imrayana*, Schott, from Dominica, also dried fruit spikes of *Scindapsus officinalis*, Schott. The latter is common in many parts of India, and used as a stimulant, diaphoretic and anthelmintic.

In the upper part of this Case observe a bundle of aerial roots of OAMBÉ CÍMA (*Thaumatophyllum spruceanum*, Schott), from Brazil. CASE 75.

Also aerial roots of *Anthurium cordifolium*, Kth., from Jamaica.

Note also strips of leaf stalks of *Anthurium violaceum*, Schott, and miniature hat made of the same, from Jamaica.

No. 151. Stem and leaves of NAI YAIN (*Epipremnum irabile*, Schott). Said to be a principal ingredient in the ell-known medicine TONGA.

Observe roots of SKUNK CABBAGE (*Symplocarpus fœtidus*, alisb.), used in medicine in North America as a stimulant, ntiperiodic and narcotic.

CASE 75. Near this are roots of SHOBU (*Acorus calamus*, var. *spurius*, Engel., and SEKISHO (*A. gramineus*, Ait.), both used in medicine in Japan.

No. 152. CALAMUS ROOT OR SWEET FLAG (*Acorus Calamus*, L.). A widely distributed marsh plant growing in Europe, Asia, and America. The creeping-root, or rhizome, is warm and aromatic, and the whole plant has a strong, sweet, aromatic smell, in consequence of which the leaves were used, until recently, to strew the floor of Norwich Cathedral on festivals.

The rhizome is sometimes candied with sugar, and used as a sweetmeat.

Water Plantain Order (*Alismaceæ*). A small group of marsh or aquatic plants found in nearly all climates. They are unimportant from an economic point of view.

The roots of *Alisma Plantago*, L., a British plant, but widely distributed in the Arctic and Northern temperate regions, as well as in India and Australia, contain a quantity of farinaceous matter, the acrid properties of which are dispelled by drying so that the roots are eaten by the Kalmucks. They are also used in medicine in Japan, under the name of SAJI OMODAKA.

Grass Wrack Order (*Naiadaceæ*). Submerged fresh or salt water plants, found in most parts of the world. They are of little or no economic value.

Observe fibrous residue of leaves of *Posidonia Caulini*, Koenig, rolled into balls by the action of the water, found on the shore at Tunis and at Cannes, South of France. Note, also, balls similarly formed of *P. australis*, Hook. f., from Australia.

On the bottom shelf note specimens of ALVA or ULVA MARINA, known also as GRASS WRACK (*Zostera marina*, L.). It is common on the British Coast and in most parts of the world, near low-water mark. The leaves when dried are used for packing and for stuffing mattresses.

TABLE CASE. In Table Case immediately opposite, observe mounted specimen and drawing of the plant of the LATTICE-LEAF of Madagascar, *Aponogeton fenestrale*, Hook. f. (Ouvirandra fenestralis, *Poir.*). The plant is singular from the interstices between the veins of the leaf being open, as shown by the mounted leaves, hence its name of Lattice leaf. The fleshy root is farinaceous, resembling the yam, and is eaten when cooked by the people of Madagascar.

Restio Order (*Restiaceæ*). A group of herbs or undershrubs with creeping rhizomes. Abundant in South Africa. Their chief uses are for making brooms by the natives, and for thatching their huts. The following are some of the species exhibited: *Restio tiliaceus*, Rottb., *R. bifarius*, Mast., *R. digitatus*, Thb., *R. callistachyus*, Kunth., *R. bifurcus*, Nees., *Hypodiscus oliverianus*, Mast., *Cannomois scirpoides*, Mast., and *Elegia parviflora*, Kth. Observe flower spikes of *Thamnochortus giganteus*, Kth., *T. argenteus*, Kth., and *T. cernuus*, Kth., imported into England from South Africa for decorative purposes. CASE 76.

Sedge Order (*Cyperaceæ*). A large tribe of grass-like plants with solid, angular, though slender stems, and the sheaths of the leaves not split in front as in grasses. They grow in every country; some of the species are widely distributed. CASE 77.

No. 153. INDIAN MAT made of the culms of *Cyperus tegetum*, Roxb. Specimens of the culms prepared for mat making, and also dyed black and red, are shown.

Note on middle shelf CHUFAS, the tubers of *Cyperus esculentus*, L., a plant common in the South of Europe; they are sold in Madrid for making an iced drink in hot weather, for which purpose they are soaked for two days in water, then pounded and the liquid frozen. When freshly dug up they have a nut-like flavour, and are eaten on the Gold Coast under the name of TIGER NUTS; they are also known as ZULU NUTS.

No. 154. ORNAMENTAL INDIAN MAT made of the dyed culms of *C. tegetum*. CASE 78.

Note culms of *C. procerus*, Rottb., and rough mat made from the same.

On the bottom shelf are roots of *Cyperus rotundus*, L., now a widely spread pest in gardens in the tropics, from Ceylon, India, and Japan, where they are used in medicine.

No. 155. Another ornamental Indian mat made of culms of *C. tegetum*. CASE 79.

Observe plants of *C. exaltatus*, Retz., and *C. articulatus*, L., from India; also ADRUE ROOT (*C. articulatus*), from the West Indies, where an infusion is used in fevers.

Note on bottom shelf small tubers of *C. bulbosus*, Vahl, used as an article of food in Southern India.

CASE 80. Another mat made from the culms of *C. tegetum* is exhibited in this Case; and in the Table Case is a very fine mat, made at Palghat from the same material.

No. 156. A remarkably fine specimen of TINNIVELLY MATTING, made from the finely split culms of *C. tegetum*, from Madras.

A rough kind of Indian mat, made from the culms of *C. inundatus*, Roxb., is also exhibited. In the lower part of the Case is a sleeping mat, made from the flattened culms of *C. alternifolius*, L., from Madagascar.

On the middle shelf note tubers of *C. scaricsus*, Br., from India, where they are used in medicine.

In Table Case observe mats from Ceylon and Formosa, made from culms of *C. corymbosus*, Rottb.

Note also matting, plain and coloured, made at Ningpo, from the culms of *C. tegetiformis*, Roxb., very largely used at the present time for floor coverings in this country. A set of tools as used by the native mat makers is also exhibited, together with samples of hats, made from the same material as the mats, and formerly imported in enormous quantities into this country and to other parts of Europe, and sold at a few pence each.

Two mats of very fine workmanship from Corea, probably made from *C. tegetiformis*, are shown.

On the opposite side of the Table Case note ropes made of twisted leaves of the HAN (*C. longus*, L.), from Guernsey, also fibre and paper made from the same.

Near these are stems of PAPYRUS *C. Papyrus*, L. (Papyrus antiquorum, *Willd.*); also papyrus documents from Egyptian tombs.

Observe on bottom of this Case a native mat from Natal, called ISITEBE, made from the culms of *Kyllinga elatior*, Kth.; also a mat and rice plate from Colombo, Ceylon, made of culms of *Fimbristylis complanata*, Link, and a sample of GAMELOTTE fibre, from the stems of *F. spadicea*, Vahl, and paper stock and paper made from the same, from Vera Cruz, where it is known as ESPARTO CHINO and ESPARTO MULATO.

CASE 81. **No. 157.** Sleeping mat from Colombo, Ceylon, made of culms of *Eleocharis plantaginea*, R. Br. Near this is a mat, also from Ceylon, made of the culms of *E. fistulosa*, Schult.

On the middle shelf observe a belt made of the PUNGAO (*Desmoschænus spiralis*, Hook. f.), from New Zealand,

CASE 81.

where the long orange-coloured leaves are used by the natives to weave strong belts.

Note also in lower part of the Case a sleeping mat, and mat holder, rice bag, and sweetmeat tray of *Scirpus grossus*, Lin. f., all from Ceylon.

No. 158. Pack saddle, as used in Guernsey for conveying the vraic or wrack from the sea shore. The outside of the saddle is made from the culms of *S. lacustris*, L., sub-sp. *Tabernæmontani*, Gmel., the inside of *Cyperus longus*.

CASE 82.

No. 159. Great Coat from Portugal, made of rushes (*Scirpus lacustris*).

Observe baskets, beehive, horse collar, hassock, &c., made in Norfolk of the BOULDER or BULRUSH (*Scirpus lacustris*).

CASE 83.

In the bottom of this Case, note shoes made of rushes (*Scirpus lacustris*), used in Denmark when thrashing buckwheat to prevent the seeds being crushed.

No. 160. Mat of very fine workmanship, probably made of the culms of *Lepironia mucronata*, Rich., at Kanghua, West Coast of Corea, obtained from the King's palace.

Observe mats such as are used by boat people in China to cover cargoes with ; also Chinese dollar bag, made of *Lepironia mucronata*.

CASE 84.

In the upper part of the Case is a rope such as is in common use in Florence, made of *Schœnus nigricans*, L., and also a basket from Queensland made of the culms of *Schœnus melanostachyus*, R. Br.

Observe paper and cloth made from COTTON GRASS (*Eriophorum polystachyon*, L.), a British plant found in wet bogs and on turfy moors.

Near this is a table mat, made by the natives of the Wimmera, South-east Australia, of the culms of *Lepidosperma squamatum*, Lab.

Observe also a basket made by the same people of *L. filiforme*, Lab.

Also a leaf of VICTORIAN REED (*L. gladiatum*, Lab.), introduced at one time for paper making. Here is also a bag from New South Wales, made of the BUCKIE RUSH (*Cladium glomeratum*, R. Br.), and a mounted specimen of the plant, and a Rice cooling tray and sleeping mat from Colombo, Ceylon, made of the culms of *Cladium riparium*, Bth. var. *crassa* (Baumea crassa, *Thw.*).

CASE 84. **No. 161.** Wisp of Sedge, *Cladium germanicum*, Schrad. (C. Mariscus, *Br.*), as prepared in the Cambridgeshire fens for lighting fires. They were in general use in Cambridge until recently, and were sold at 2½*d.* each, or six for 1*s.*

Observe Net made by the Murray River tribe from the fibre of the Australian *Carex tereticaulis*, Muell. Also SEEGRASSE used for stuffing furniture, principally composed of *Carex leporina*, L., from Thun, Switzerland.

Note open mat made of *Carex brizoides*, L., from the market, Zurich, and table mats from Japan made from the culms of *Carex rhynchophysa*, C. A. Mey, and sold in London.

On the lower shelf are shown hassocks and broom, from Sussex and Norfolk, made of *Carex paniculata*, L.

ROOM No. 8.

CASE 85. **Grass Order** (*Gramineæ*). These plants are familiar to us, clothing our meadows, pastures, and waysides; they, however, feebly represent the gigantic grasses of the tropics, some of which, as the bamboos, attain a height of 100 feet or more. The Order is one of the most important from an economic point of view, including as it does all the cereals, wheat, barley, oat, rice, Indian corn, &c.

TRIBE I. *PANICEÆ.*—**No. 162.** GERO, *Pennisetum typhoideum*, Rich. (Penicillaria spicata, *Willd.*) This grain, known also as AFRICAN MILLET, is in daily use as an article of food on the Niger and Gambia. The specimen here exhibited shows the mode in which the spikes are secured together for convenience in transit, as they are easily rolled up and conveyed on the backs of oxen from one market to another. Most of the native beer is prepared from Gero grains, specimens of the grains are shown in Case 88.

CASE 86. [This Case contains several illustrations of the uses of JOB'S TEARS, the fruits of *Coix Lachryma-Jobi*, L. (see Case 88), the hard-shelled involucre of which causes them, to be much valued for ornamental purposes. The specimens shown in this Case are a Bornean jacket, probably made of cotton and fringed with Job's tears; an entire dress of a Fijian girl, made of the fibre of *Hibiscus tiliaceus*, and ornamented with Job's tears. Also a necklace from Jamaica and a table mat from Madeira, made from the same fruits.]

CASE 87. On the top shelf is a series of samples of KODO millet (*Paspalum scrobiculatum*, L.), an erect grass from 1 to 2 feet

high, much grown in India as a food plant; the grains, CASE 87.
though liable to act as a narcotic poison, are boiled and eaten in the same way as rice, or ground into meal and used for puddings.

Note samples of FUNDI, FUNDUNGI, or HUNGRY RICE (*Paspalum exile*, Kipp.), from Gambia where, as also in Sierra Leone and other places on the West Coast, it is largely used as food.

Observe halter made of WIRE GRASS (*Paspalum filiforme*, Sw.), from Jamaica, and samples of CUT HAND GRASS (*P. virgatum*, L.) and rope made from the same from Antigua.

Also broom made of the flowering panicles of *Panicum acariferum*, Trin., much used for sweeping houses throughout the North Circars.

No. 163. CHINA or INDIAN MILLET (*P. miliaceum*, L.). An erect annual, about 2 feet high, native probably of Egypt or Arabia, and introduced at a very early period into India, where it is now largely grown as a food crop, being eaten either boiled with milk and sugar, or used in curries, or parched in hot sand. Numerous varieties are exhibited from different parts of India, as well as from China, Japan, and Persia.

No. 164. SANWA MILLET (*P. frumentaceum*, Roxb.). This is an erect grass, growing sometimes to a height of 4 feet. It is cultivated in India as a food plant, but does not take a very high place. It is a very quick-growing plant, the harvest following within six weeks of the sowing.

On the bottom shelf observe seeds of the GUINEA GRASS (*P. maximum*, Jacq.), one of the best fodder grasses of the tropics. A broom made from the fruiting spikes of this grass from Seychelles, where it is known as FATAQUE GRASS, is also shown; also GRINDING STONE, METATE or MULLER, from Humboldt Lake, Nevada, where it is used for grinding grass, chenopodium, or sunflower seeds.

No. 165. KUTKI or LITTLE MILLET (*P. miliare*, Lam.). CASE 88.
An annual grass, 2 to 3 feet high, native of India, where it is also cultivated as an article of food, and the straw is eaten by cattle.

No. 166. SHAMA MILLET (*P. colonum*, L.). A common tropical and sub-tropical grass, growing from 2 to 3 feet high, cultivated in India both as a food and fodder plant.

CASE 88. **No. 167.** ITALIAN MILLET (*Setaria italica*, Beauv.). An annual, said to be originally a native of China, Japan, and the Indian Archipelago. It is nutritious and digestible, and is much valued as an article of food in some parts of India. Numerous samples are exhibited both of the ears and of the seeds, husked and unhusked, from India, Siam, Japan, &c Some mounted specimens are shown in Case 86.

Observe seeds of BAJRI or BULRUSH MILLET (*Pennisetum typhoideum*, Rich.). (*See* No. 162, Case 85.)

Leaves also are shown of *Lygeum Spartum*, L., a native of the Mediterranean region, and known amongst paper makers as ALBARDIN.

TRIBE II. *MAYDEÆ.*—**No. 168.** JOB'S TEARS (*Coix Lachryma-Jobi*, L.). Plants bearing fruits are exhibited from India and West Coast of Africa, also numerous varieties of seeds showing the great differences in shape and colour assumed by them in different countries. The nearly globose, slate-coloured seeds are mostly used for rosaries, necklaces, bracelets, &c. The centre part of the seed is edible, and forms an occasional article of food to the people in Assam. In Burma the grains are parched and eaten like Indian corn.

Note seeds of *C. Lachryma-Jobi*, L., var. *frumentacea*, Oliv., from India. Also seeds of *C. Lachryma-Jobi*, L., var. *stenocarpa*, the elongated form of which is very distinct from all the others, and the colour is of a light cream. They are much used for ornamenting the dresses of the Karens, a semi-aboriginal tribe inhabiting certain districts of Lower Burma. They have recently attracted some attention in this country for decorative purposes. (See *Kew Bulletin*, 1888, pp. 144, 145.)

The lower part of this Case and the whole of Case 89 are devoted to INDIAN CORN or MAIZE (*Zea Mays*, L.). A handsome, erect, annual grass, native originally of South America, introduced at an early period into the Old World, and now a most important cultivated food plant in the East Indies and North Africa; it is also grown in Southern Europe, and with us as an ornamental garden plant. The use of Indian corn in this country as a food product has very much increased of late years, over 32 000,000 cwts. having been imported during the year 1893. It is from this grain that "Corn Flours" are prepared.

A large series of ears and grains of maize from Siam, India, North and South America, Natal, Sierra Leone, &c., is shown in this Case and the next.

On the bottom shelf of Case 88 observe a series illustrating the preparation of CORN FLOUR from maize. Also a cornball, made of popped grains of maize by heating them on a metal plate or in a wire cage over a brisk fire, the heat causes the grain to burst and expose the starchy white contents; upon being sweetened with sugar or honey it forms a well-known sweetmeat. Popped cornballs are usually made in New York about the size of the fist. CASE 88.

Note near this a door mat from Natal and a hat from Jamaica made of the husk which envelopes the cob of maize.

Observe also stigmas of maize used in medicine in North America, and a GRINDING STONE, METATE or MULLER, from Costa Rica, used for grinding corn and other grains.

No. 169. Ears of Maize from Peruvian tombs. Samples of Sugar and Glucose obtained from maize in North America, are here shown; also Tobacco pipes made of Maize Cobs after removal of the grains and sold in England; and Fire-lighters as used in France, consisting of the core of Maize Cobs and sold at from 12 to 20 francs per 1,000. CASE 89.

ROOM No. 9 (GALLERY).

TRIBE III. *ORYZEÆ.* This Case, which is the first on the left immediately upon entering the Gallery from the stairs, contains on left-hand side of the Case long stems of *Zizania aquatica, L.*, largely used in the manufacture of paper in the United States; a sample of half-stuff is shown. Various kinds of PADDY, bearded and naked, from different parts of India are also shown. The term Paddy is always given to rice in the husk. CASE 90.

The Rice plant (*Oryza sativa*, L.), is an annual grass, growing from 2 to 10 feet, or more, high. In India, where it is found wild, its cultivation is of the highest antiquity. It is said to have been introduced into China about 5,000 years ago. At the present time it is grown in nearly all hot countries extending to Southern Europe, and into several of the Southern States of America, especially North and South Carolina, where some of the finest rice is produced. Patna and Arracan rice also command a large sale in the London market. This grain furnishes to the human race a larger proportion of food than any other single species. The imports of rice into this country amounted, in 1893, to 4,313,020 cwts., CASE 90. from British East Indies, and 1,136,577 cwts. from other countries, making a total of 5,449,597 cwts.

On the bottom shelf are hand rakes and a hoe, such as are used in the rice fields in the Naga Hills, Assam.

CASE 91. This Case contains a large series of unhusked rice from various parts of India and other rice-growing countries. On the central shelf note a small series illustrating the manufacture of rice starch.

CASE 92. In this Case is a series of husked or cleaned rice, also from different parts of India and other countries. Note model of Indian rice grinder and models of rice pounders as used in India. Also sample of Arrack, a strong spirit distilled from rice in India.

CASE 93. TRIBE VI. *ANDROPOGONEÆ.* Various samples of SUGAR, raw and refined, are here exhibited; they are the produce of the SUGAR CANE (*Saccharum officinarum*, L.), a woody stemmed grass growing from 8 to 12 feet high, occurring both wild and cultivated throughout Tropical and Sub-tropical Asia. The cultivation of the plant extended to Persia in the early Middle Ages, and was carried by the Arabs into Sicily, Cyprus, Spain, and Italy. It quickly spread into other parts of the world, being introduced to San Domingo in 1494, and into Brazil early in the 16th century. At the present time it is very largely grown in the West Indies, Mauritius, British Guiana, Natal, Queensland, Java, and many other countries. Near Malaga, in Spain, is the only place in Europe where its cultivation is still carried on.

To obtain sugar the stems are cut down, stripped of their leaves, and passed between heavy iron rollers; the juice thus obtained is boiled, clarified, and evaporated, and when it has acquired a proper tenacity and granulation, it is emptied into a cooler to crystallise; after which the concrete sugar is placed in casks and allowed to drain, when it is transferred to hogsheads, and is ready for exportation under the name of raw or muscovado sugar. The uncrystallisable portion which runs from the raw sugar is known as molasses.

To prepare sugar for table and other uses it is either treated by "centrifugals" and washed to obtain white crystallised sugar or subjected to a process known as refining, in the course of which it is concentrated, and the syrup poured into conical moulds; when this has solidified the loaves, as they are called, are placed in pots so that the drainings, which constitute treacle, may run from them, and when thoroughly drained, the sugar is known in commerce as loaf sugar. CASE 93.

Note in this Case drawings of different varieties of sugar cane cultivated in Mauritius, also photograph of flower-head of sugar cane, called the "Arrow," and of a cane field in Jamaica during the process of cutting, and samples of molasses, and rum, a well-known spirit distilled from molasses or cane juice.

CASE 94. This Case contains two native robes from Tahiti, made of Tapa cloth (*see* Museum No. I., Case 98), ornamented with the cuticle of the leaves of the sugar cane.

CASE 95. Various samples of raw sugar are shown in this Case, chiefly from Penang, Hong Kong, Japan, Siam, Formosa, and India.

The total imports of unrefined sugar from all countries during the year 1893 amounted to 16,036,935 cwts., and of refined sugar and candy during the same period to 11,569,739 cwts.

On the bottom shelf observe models of sugar presses, as used in India.

CASE 96. In the upper division are specimens of sugar cane from Grenada, Natal, Formosa, and Queensland. Also a portion of a stem of a variety known as the Elephant sugar cane from Saigon.

No. 170. Specimens of SUGAR CANDY and other sweetmeats made from sugar.

Observe in middle division a specimen of MEGASSE, or Bagasse, the refuse of the sugar cane after passing through the rollers of the sugar mill for the expression of the juice. It is generally used in the tropics as fuel, but latterly an attempt has been made to use it for paper making. Samples of paper made from it are shown.

Note illustrations of the diseases of the sugar cane; also plate showing "seed" of the sugar cane and the germination, observed at Kew in 1890.

[On the wall under the circular window, between Cases 98 and 99, observe an oil painting illustrating the manufacture of sugar at Katipo, near Teté, in Eastern Tropical Africa. It represents the cutting of the cane into lengths, crushing it in the mill, and the subsequent boiling and crystallisation of the juice. A painting of the Sugar Cane is shown on the wall under the circular window between Cases 103 and 104.]

No. 171. Ropes, twine, mat, and fibre from the stems of the MUNJA (*Saccharum Munja*, Roxb.), a common grass in Northern India. The fibre is valued on account of its elasticity

CASE 96. and strength, and its power of resisting moisture. Another mat of the same material is shown in the next Case.

Observe on lower shelf specimens of stems of *S. spontaneum*, L., used in India for making ropes and mats, one of which is exhibited. It has been proposed as a paper material. Samples of paper stock prepared from it are shown.

CASE 97. **No. 172.** SIRKEE MAT, made of the twisted stems of the MUNJA (*S. Munja*), from Calcutta.

On top shelf note necklace made of straw of SARPAT, *S. ciliare*, Anders. (S. Sara, *Roxb.*) from India, also half-stuff for paper making made from the culms.

No. 173. Stems, fibre and paper stock of BHABUR GRASS or BANKAS, *Ischæmum angustifolium*, Hackel. (Pollinia eriopoda, *Trin.*). This grass, which is common in many parts of India, has attracted much attention of late both in this country and in India as a paper material. It is largely used in the latter country for making ropes, cordage, mats, &c., specimens of which are shown from Saharunpore. (See *Kew Bulletin*, 1888, pp. 157, 160.)

On the middle shelf observe specimens of leaves of *Heteropogon contortus*, R. & S., with half-stuff and paper pulp made from it, from Madras.

Also on lower shelf observe grass of *Andropogon Schœnanthus*, L., the GINGER GRASS or RUSA, of North and Central India. The oil, obtained by distillation, is largely used in European Turkey to adulterate attar of rose. Samples of this oil as well as that from *A. citratus*, DC., known as the LEMON GRASS, are shown. This last species is cultivated in Ceylon and Singapore exclusively for the oil.

CASE 98. **No. 174.** KHUS KHUS, the roots of *A. muricatus*, Retz. It grows in many parts of India and Burma, and is cultivated exclusively for its roots, which are used for making the fragrant fans or screens known as TATTIES, hung before the open windows and doors of houses. Upon being sprinkled with water they produce a fragrant coolness by evaporation during the hot winds. Fans, baskets, and handscreens are shown, made of these roots, together with samples of oil distilled from them.

Observe CITRONELLA OIL, distilled from the leaves of *A. Nardus*, L., var. *citronella*, a native of Ceylon, where it grows up to the level of 3,000 feet, but it is also cultivated to a large extent, as well as at Singapore. In Southern India the plant is

CASE 98. also found. The oil distilled from this, like that from the other species, is used in perfumery very largely in this country and in the United States for perfuming soap. In India these oils are used internally as stimulants, carminatives, and antispasmodics, and externally as rubefacients.

In the lower division of this Case note a Japanese coat, made of the leaves of an undetermined species of *Andropogon*.

No. 175. French Whisk (*Chrysopogon Gryllus*, Trin.). Imported from South of France and Northern Italy, and largely used in the manufacture of brushes, specimens of which are exhibited.

CASE 99. This Case is devoted entirely to illustrations of the Sugar Sorghum (*Sorghum saccharatum*, Moench), known also as the Broom Corn. It is cultivated in some parts of Northern India, China, and Japan, and has lately received a considerable amount of attention in North America as a sugar-producing grass. Samples of Sugar prepared from the stems are shown on the lower shelf. In India this grass is considered a valuable fodder plant.

CASE 100. The whole of this Case is filled with specimens of ears, grains, and products of the Great Millet or Guinea Corn (*Sorghum vulgare*, Pers.). This is a tall growing grass, cultivated in many parts of Southern Europe, also in India, where it is known as Joar, and in Africa, where it is called Dhurra. There are many well-marked varieties of this species, differing chiefly in the size and form of the panicles, some of which are loose and spreading, while others are dense and compacted; they also vary in colour, being black, white, yellow, or red. This grain is one of the most important rainy season crops of India, and forms one of the staple foods of the Old World tropics.

Samples of flour prepared from the grains as used in India are shown on the lower shelf; also Italian or Venetian Whisk, the fruit spikes after the removal of the grains, used in the manufacture of brooms and brushes.

Tribe VII. *PHALARIDEÆ.* Note specimens of the Sweet Scented Vernal Grass (*Anthoxanthum odoratum*, L.).

CASE 101. **No. 176.** Baskets and table mats made in North America of the fragrant grass *Hierochloe borealis*, R. & S. It is known in England as Holy or Sacred Grass, from its having been used for strewing on church floors.

Note specimens of Canary Grass (*Phalaris canariensis*, L.), the seeds of which are used chiefly for feeding caged birds, CASE 101. and are largely consumed in the manufacturing districts of Lancashire and Yorkshire. It is cultivated chiefly in Kent, and is also imported in large quantities from Barbary, Turkey, and Holland.

TRIBE VIII. *AGROSTIDEÆ.* In the middle and lower divisions of this Case are numerous illustrations of the uses of ESPARTO GRASS, *Stipa tenacissima*, L. (Macrochloa tenacissima, *Kth.*), consisting of baskets, hats, mats, &c. A native of Spain, Italy, and North Africa; it was used in the time of the Romans for coarse cordage, and is now extensively employed for paper making.

CASE 102. Further specimens of mats, baskets, rope, &c. of Esparto are shown in this Case, and in the middle division are various commercial samples of the grass imported from Spain, Tripoli, Tunis, Algeria, &c.

CASE 103. **No. 177.** Pannier made of Esparto, from Chichlana, Spain. Note on back of Case at top a door mat made of Esparto from Chichlana, Spain; and on the top shelf is a series of specimens of paper stock and different qualities of paper made from Esparto, also a sample of the POISONOUS GRASS of Kashmir (*Stipa sibirica*, Lamb.), which produces injurious effects upon cattle feeding upon it. (See *Kew Bulletin*, 1895, p. 58.)

No. 178. Awns of *Stipa spartea*, Trin. A grass very abundant in the prairies west of the Red River Colony, U.S.A. The awns get fixed in the wool of the sheep, and gradually penetrate the flesh, thereby killing the animals.

No. 179. FEATHER GRASS (*Stipa pennata*, L.), a wiry grass, rare in this country. The flowers are produced in loose panicles, which are dried and sometimes coloured for ornamental purposes.

Note also sample of SAP GRASS, probably the produce of *S. pennata* from Khuram, where it is collected and used as bedding, and bunches of the long pendent grass are hung on long poles around shrines.

Observe basket used in Ladak for carrying fruit, and strainer for filtering country spirit, made of CHEEP CHANG GRASS, probably *Muehlenbergia alpestris*, Trin.

No. 180. RAIZ DE ZACATON, BROOM ROOT, or MEXICAN WHISK (*Epicampes macroura*, Bth.). This root is shipped from Vera Cruz, chiefly to Germany and France, but also in small quantities to England. It is used by the Germans and French to mix with French Whisk for the manufacture of velvet brushes, clothes brushes, &c., which are shipped to this country and sold at a very low price. It is inferior in quality to French Whisk, and is liable in drying to become brittle and break off. (See *Kew Bulletin*, 1887, Dec., p. 9.) CASE 103.

Note hair brushes or combs, such as are used by the Patagonian Indians, made of BROOM ROOT.

Observe also samples of TIMOTHY GRASS (*Phleum pratense*, L.), an excellent fodder and well-known pasture grass.

In the lower division of this Case note a Basket and Hassock made of the MARRAM GRASS, or SEA REED (*Ammophila arundinacea*, Host.), the former from Norfolk, the latter from Lancashire. Also a table mat from Dorsetshire, and shoes from Yarmouth. A mat is also shown, made of this grass by the Welsh peasants, such as is used in churches and houses in Wales. In 1641 it is recorded that mat and rope making from the Marram grass was the only handicraft of the inhabitants of the village of Newborough.

TRIBE IX. *AVENEÆ.* In the upper part of this Case observe flowering specimens of several British grasses, including *Aira cæspitosa*, L., *A. flexuosa*, L., *Holcus lanatus*, L., and others. CASE 104.

The remainder of the Case is devoted to illustrations of the OAT (*Avena sativa*, L.), an annual grass extensively cultivated under numerous varieties in Middle and Northern Europe. It is a very important grain crop in Scotland, where the seeds form a staple article of food amongst the people. By kiln drying and removing the husk, which adheres firmly to the grain, oats yield groats or grits, which when ground constitute oatmeal, and is used for making porridge or oat-cake, which is very nourishing, though slightly laxative. The Oat is hardier than wheat or barley, and with us is chiefly used for feeding horses.

A specimen of WILD OATS (*Avena fatua*, L.), BRISTLE POINTED OATS (*A. strigosa*, Schreb.), and FLY OATS (*A. sterilis*, L.); also LATE and EARLY ANGUS, and BLACK TARTARIAN OATS, varieties of *A. sativa*.

No. 181. Ancient HAND QUERN, formerly used for grind- ig corn in the North of Ireland.

Further specimens of varieties of cultivated Oats are con- inued in this Case, including DUN WINTER, SANDY, POTATO, BARBACHLAW, and HOPETOUN. CASE 105.

CASE 106. Note on upper shelf BROWN and WHITE GROATS. Also specimens of Oat-bread from Sweden, and Norwegian FLADBROD, or flat bread; this is usually made of Barley Meal or Barley and Oatmeal mixed, and baked in thin circles over a wood fire.

TRIBE X. *CHLORIDEÆ.*—**No. 182.** Numerous varieties of RAGI (*Eleusine coracana*, Gaertn.), a semi-erect or decumbent Indian Grass, furnishing the staple grain of the Mysore country, where it is sometimes stored in pits, keeping good for many years. In some districts Ragi is commonly used by the poorer classes, while in Patna and Behar it is more esteemed than Maize. A fermented liquor is prepared from the grain in Darjiling.

No. 183. Trays made of leaves of *Dinebra retroflexa*, Panz., used by the natives of Nubia and Abyssinia for carrying or covering their meals.

CASE 107. TRIBE XI. *FESTUCEÆ.* Note in centre of the Case flower spikes of *Gynerium saccharoides*, H.B.K., from Dominica and Brazil. It is imported into this country for decorative purposes under the name of UVA GRASS. Observe also Hats made of the leaves of this plant in Dominica and from the Rio Casiquiare.

No. 184. CURABI, or Poisoned Arrows of the Macu Indians, from Rio Uauri. The shafts are made of the flower stem of *G. saccharoides*, and the heads of the wood of the "Mura piranga."

No. 185. Poisoned Arrows made by the Catauixi Indians, on the Rio Negro, from the flower stalks of *G. saccharoides*.

[In the centre of the Room, hanging from the ceiling, observe a Bird Cage made of the flower stalks of *G. saccharoides*, from Dominica.]

Observe flowering spikes of PAMPAS GRASS (*G. argenteum*, Nees.), a tall South American grass, cultivated for ornament out of doors in Britain.

No. 186. Arrows made of the flower stalks of the ARVORE DE FRECHA (*Gynerium saccharoides*), used by the Tapuyo Indians at Santarem for killing fish.

Note on bottom shelf portion of lower part of stem of ARVORE DE FRECHA. The entire height of this was twenty feet, and during the inundation of the Amazon, when the river sweeps along with great fury, the plant would be uprooted, if not held fast by the descending branches which root in the mud. CASE 107.

Note portion of TONARA, or net made of *Ampelodesma tenax*, Link. Used on the Tuscan coast in the Tunny fishery. The nets are very durable if kept in water and protected from the action of the sun.

Observe also samples of DISS (*Ampelodesma tenax*) from Portofino, Genoa, and rope made from the Grass. It has been imported from Sicily for paper making.

No. 187. VISCHIO, apparatus for snaring birds with bird-lime, from Verona, made from the stem of the Provence Reed (*Arundo Donax*, L.), a tall reed-like grass, native of Southern Europe and Northern Africa. A DISTAFF made from the same stems, also from Verona, is likewise shown. CASE 108.

No. 188. Stems of *A. Donax*, with rhizomes attached, known as NANA CANES, and imported from Algeria for walking sticks and umbrella handles. Some full-grown stems from Tangier are shown in front of the Gallery.

On the middle shelf observe an ornamented snuff box made of a piece of a stem of *A. Donax*, from Tangier. Also pieces of stems used by the Afghans to hold charges of gunpowder. A small basket, made of the split stems, from Portugal, and roots, or rhizomes, used in medicine in France.

In the lower division of the Case are baskets from Spain, made of the split stems of the same plant.

No. 189. DUSTING BRUSH and BROOM, from France and Italy, made of the flower spikes of the COMMON REED, *Phragmites communis*, Trin. (Arundo Phragmites, *L.*).

Observe a bundle of Reeds from Norfolk, and a portion of a ceiling, 100 years old, from a house in Somersetshire, consisting of plaster and the stems of *P. communis.*

At the back of the Case note a rough mat made in India from the split stems of *Arundo* sp.; note also stems of *A. Karka*, Retz., and a sample of twine made of the fibre from the flower stalk.

In the upper division is a series of samples of straw, plain and dyed, of the CRESTED DOG'S-TAIL GRASS (*Cynosurus cristatus*, L.), a common British species, also a mat and basket made from the same straw by the peasantry in county Wexford, Ireland. CASE 109.

CASE 109. Observe specimens of PURPLE MELIC GRASS (*Molinia cærulea*, Moench), a British species, proposed as a material for paper making; samples of paper stock and finished paper made from the grass are shown.

No. 190. Seeds of red and white varieties of TEFF (*Eragrostis abyssinica*, Link). It was cultivated by the ancient Egyptians and found in ancient clay bricks. It is now commonly grown over Abyssinia, where it is much used for making bread. (See *Kew Bulletin*, 1887, Jan., pp. 2–6.)

Note rope made of the strong coarse stems of *Eragrostis cynosuroides*, Retz., known in India as the DAB GRASS.

No. 191. Stems of *Uniola virgata*, Gr. A stout rigid West Indian grass, together with ropes made from it. It has been proposed as a paper material, but has not been successfully utilised.

Note fruiting spikes of *Uniola paniculata*, L. Imported from North America for decorative purposes.

No. 192. MANNA CROUP. A preparation from the small seeds of *Glyceria fluitans*, Br., used as an article of food in Germany as well as in Holland, Poland, and Russia.

Several well-known British fodder grasses are shown in this Case, among them being *Festuca elatior*, L., *F. ovina*, L., *F. sylvatica*, Vill., *F. pratensis*, Huds., *Briza media*, L., *Poa annua*, L., &c., &c.

CASE 110. Observe seeds of TUSSOCK GRASS, *Poa flabellata*, Hook., (Dactylis cæspitosa, *Forst.*). A native of the Falkland Islands, but introduced to this country for cultivation as a fodder plant in 1842. It has never succeeded, however, except in the West Coast of Scotland, where it has become established.

Further illustrations of fodder grasses are shown in the upper part of this Case, including *Poa pratensis*, L., *P. nemoralis*, L., *P. trivialis*, L., and *Bromus arvensis*, L.

TRIBE XII. *HORDEEÆ*, note *Lolium perenne*, L., and its cultivated form *L. italicum*, A.Br., and DARNEL, *L. temulentum*, L., with its variety *L. arvense*, With.

No. 193. RYE (*Secale cereale*, L.). Formerly extensively cultivated in this country, and still grown to some extent, especially in the Eastern Counties, chiefly as a green fodder. Some of the principal cultivated varieties of rye are shown, also bread made of rye flour eaten in Finland, and plaits of rye straw from Nice.

In the upper division observe specimens of prepared rye straw, together with a hat and mats made from the same by Irish peasantry at Wexford. CASE 111.

Note also roots of COUCH GRASS (*Triticum repens*, L.). A troublesome weed, used at Great St. Bernard for straining milk; they are also sold in Paris under the name of CHIENDENT and used as a tisane or demulcent drink. Couch grass roots have been proposed as a paper material, and samples of paper made from them are exhibited.

No. 194. Mounted specimens of *Triticum* (*Ægilops*) *ovatum*, Rasp., which has been suggested as the wild form of cultivated wheat.

A sample of the first meal ever made from the grains of *T. ovatum* is shown.

No. 195. **WHEAT** (*Triticum sativum*, Lam.). It is unknown in a wild state, but its culture is coeval with the history of agriculture itself; it is now grown all over the world; but more abundantly in the northern than in the southern hemisphere. A great number of varieties of cultivated wheat are known, classified generally as hard or soft, red or white wheats; they also differ considerably in chemical composition, the whitest and softest kinds containing but half the flesh-forming substance present in the dark and hard varieties.

A dry grain of wheat was the origin of our smallest measure. From Alfred (871–901) to Henry VII. (1485–1509) the penny was fixed to weigh "32 grains of wheat, round and dry, and "taken from the midst of the ear." The Greek, Roman, and Irish systems all took "as their smallest unit a grain of corn." Note: "Practically four wheat corns = three troy grains" (Ridgway).

Several varieties of wheat both in the ear and grain are shown.

[Under the circular window between Cases 111 and 112 observe a diagram illustrating the flowers and grains of wheat, oat, barley, and other grasses.]

This Case is devoted chiefly to illustrations of varieties of wheat. CASE 112.

Note grains of wheat and barley from Egyptian tombs.

A large portion of this Case is occupied with a continuation of specimens of wheat of different varieties. CASE 113.

Observe also mounted specimens showing the life history of the GRANARY WEEVIL (*Calandra granaria*) and the HESSIAN FLY (*Cecidomyia destructor*).

CASE 113. **No. 196.** Harvest-home figures made of wheat ears known in Cornwall and West Devon as KERN-BABIES or CORN-BABIES. On the bottom shelf observe native Indian hand mill for grinding wheat, and a model of a native flour mill from the Punjab.

CASE 114. **No. 197.** Series of products obtained in the process of milling wheat. In grinding wheat two distinct products known as FLOUR and BRAN are produced, the first a fine white powder, the second a coarse husky substance. Both flour and bran are, however, of several degrees of fineness, such as fine flour, seconds, bran, pollard, and sharps. These several mill products are obtained by a system of screening. FINE wheat flour is poorer than SECONDS flour in bone-forming and flesh-forming matters, but it contains more starch.

Note series of wheats from different localities in India.

No. 198. Flour buried by Captain Beechey, R.N., in 1826 at Chamisso Island, Kotzebue Sound, for the use of Sir John Franklin, and when dug up by Captain Kellet, R.N., in 1849, found to be perfectly good.

Observe specimens of wheat starch prepared for finishing lace, silk, or cotton.

No. 199. Various sorts of MACCARONI and VERMICELLI prepared from fine wheat flour in Italy and Sicily.

Observe sample of wheat attacked by the disease known as MILDEW, a microscopic fungus (*Puccinia graminis*, Pers.), widely distributed over the world, on grasses, and especially on cereals.

No. 200. Copy of an etching from a painting by Berghem drawn with the SMUT OF WHEAT (*Ustilago segetum*, Dittm.).

Note samples of paper pulp, and finished papers made from straw.

CASE 115. This Case is devoted entirely to illustrations of wheat straw used for plaiting, together with examples of plait and articles made from it.

In the upper division note Tuscan straws of various qualities from Florence, the produce of *Triticum sativum*, var. *æstivum*, also bleached straw ready for sizing, and assorted straws ready for splitting.

No. 201. STRAW HAT as used in Northern Portugal, and basket used by the peasantry about Pavia.

CASE 115.

Observe a STRAW RING used in Switzerland to stand round-bottomed pots upon.

Some very fine samples of straw plait and articles made from it are shown, including a seven-plait hand-sewn Tuscan Hat from Florence; also instruments used for splitting the straws, and specimens of Chinese straw plait as imported from Shanghai.

ROOM No. 10.

CASES 116 and 117.

This and the next Case (117) contains numerous varieties of English grown Barley (*Hordeum vulgare*, L.), one of the cultivated plants of Egypt and Palestine. Grains of barley have been found in the Egyptian tombs. The plant is hardier than either wheat or oats, and may be grown in high northern latitudes. It was largely used in ancient times as an article of food, but the bulk of the barley now cultivated with us is used for malting, in the production of beer, spirits, and vinegar. Ground into a meal it is also largely used for feeding pigs, and when deprived of its husk by milling it forms SCOTCH or POT BARLEY, and by rounding the grains and removing the outer coat PEARL BARLEY is produced. Specimens are exhibited.

"The TROY GRAIN is nothing more than the barley-corn,
" which was used as the weight unit in preference to the grain
" of wheat in some parts of the Roman empire" (Ridgway).

No. 202. Series illustrating the process of malting. The barley, having been made to germinate by warmth and moisture, is dried and its vitality destroyed. Its infusion contains sugar and is then fermentable.

On the middle shelf observe several specimens of skinless or naked barley, in which the paleæ do not adhere to the grains, but drop off in threshing, leaving the grains naked like those of wheat. Samples are shown from Tibet and from Saharunpur, the produce of a variety of the common barley, described as *H. gymnodistichon*.

Note also a sample of MI-MÊH, or RICE WHEAT, from Ichang, the produce of *H. Ægiceras*, Nees., perhaps, also a variety of *H. vulgare*, L.

On the bottom shelf are Table Mats and Baskets from Labrador, made of LYME GRASS (*Elymus arenarius*, L.). A common sand binding grass of the British shores, but found also in other parts of Europe, as well as in North Asia and North America.

CASE 118. TRIBE XIII. *BAMBUSEÆ.* On the bottom shelf observe brooms and baskets from Dominica, made of the split stems of *Bambusa vulgaris*, Schrad. (*See* Case 119.) At the back of the Case note Rough Mat made of the split stems of *Arundinaria falcata*, Nees., from India. Also walking, umbrella and parasol sticks of DOGHEAD BAMBOO, TONQUIN CANES, and CAROLINA REEDS, all undetermined species of *Arundinaria* imported from China. A very long stem of Carolina Reed is shown on the Gallery (Room No. 9).

CASE 119. Along the top of Cases 119, 120, and 121, observe a BLOW PIPE, from British Guiana, consisting of a single internode of a stem of *Arundinaria schomburgkiana*, Bth. The internodes of this species are said to be sometimes 16 feet long. Poisoned darts are used with these blow pipes, and the poisoned end breaks off and remains in the wound of the animal struck.

Note also stems of *Chusquea Quila*, Kth., from Chili. Other specimens of stems of this plant are shown at back of Case 119; and in the lower division of the Case are stems of *Guadua amplexifolia*, Presl., from Venezuela.

No. 203. Rough and finished walking sticks of WHANGEE CANE (*Phyllostachys nigra*, Munro). Note sticks, rough and finished, of BLACK BAMBOO and YELLOW BAMBOO (*Bambusa* sp.), imported from China.

No. 204. Various samples of TABASHEER, a siliceous concretion found inside the stems, at the joints of *Bambusa arundinacea*, Retz., the SPINY BAMBOO, and probably other species of bamboo. It consists of irregularly shaped fragments of an opaque white or bluish opalescent colour, the largest pieces are sometimes about an inch in diameter. In its raw state it is usually blackened and dirty, having apparently been obtained by burning the bamboos; for use it is calcined, when it becomes quite clean. It is largely used in India as a medicine.

No. 205. Fine specimen of the rhizomes or subterranean stems of Bamboo (*Bambusa vulgaris*, Schrad,) from Calcutta. (*See* Case 118.)

CASE 120. **No. 206.** BAMBOO RICE, the seeds of *B. arundinacea*, used as food by the poorer classes in India, as an occasional substitute for a deficient rice or millet crop.

No. 207. SUNBLIND, made of very finely split bamboo, almost as fine as thread, used only by high Mandarins in Corea.

CASE 120.

A series of sieves, trays, fish traps, fishing baskets, &c., made from the split stems of *B. arundinacea*, is here shown; also BAMBOO PICKLE, the young succulent shoots of the bamboo, used in India.

No. 208. FIGURES carved by Chinese from the rhizome of bamboo; other specimens are shown in Table Case opposite.

CASE 121.

At the back of the Case observe a SUNBLIND from Corea, similar to No. 207, but of somewhat coarser workmanship.

Stems of *B. arundinacea*, and matting made of the split stems of the same species, from India, are also shown.

CASE 122.

Note in upper part of Case a LEPCHA HAT made of strips of bamboo, and leaves of a species of *Phrynium*.

No. 209. SHIRT made of pieces of fine bamboo threaded together, and worn by the Chinese next the skin in hot weather.

Note the irregularly jointed stems of the WHAMPOA BAMBOO (*Bambusa heterocycla*, Carr.), used for making walking sticks; also *B. polymorpha*, Munro, from India, where they are used for making baskets, mats, &c. A stem is also shown in Museum No. III.

CASE 123.

Two hats, made of bamboo, one as worn by Chinese labourers, and the other by Bhutias, are shown in the upper part of this Case.

No. 210. KIAN PAKKIAN OR BODY CLOTH, made of very fine shreds of bamboo, passed between the teeth, and bitten until they become quite soft and fit for weaving. It is the only article of dress worn by the inhabitants of Celebes. This specimen was made specially for the Rajah.

Note on left-hand side stems of SQUARE BAMBOO (*B. quadrangularis*, Fenz.), from Wenchow, China, and opium pipe made from one of the stems; also on right-hand side stems of *B. Tulda*, Roxb. The latter is the common bamboo of Bengal. The stems are very strong, and are used for scaffolding and roofing, and, when split, for making mats.

CASE 124.

At the back of the Case is a painted SUNBLIND, made of finely split bamboo, from China.

Observe also Chinese bamboo chopsticks and GROGOH, or trap used for catching river fish in the Straits Settlements. It is made of a single piece of bamboo stem split and plaited.

Amongst other objects here shown are the following:—

Ornamental baskets made of split bamboo, from China and Siam; waterproof paper, from China; slow match of bamboo

CASE 124. fibre, from Japan; narrow strips of bamboo, used in North Formosa as a substitute for cord; basket, hat, and fan, from North Formosa; and stems of *B. nutans*, Wall., and bows made from them, from India.

CASE 125. In the centre of the Case observe a flowering panicle and stems of *B. pallida*, Munro, from India. Observe also a ROUGH BROOM, such as is used in China, made entirely of bamboo; a BLOW PIPE from Perak, made of a single joint of bamboo (*Bambusa Wrayi*, Stapf), see *Kew Bulletin*, 1893, pp. 14–16; and leaves of *B. tessellata*, Munro, used for lining the boxes for packing the finest Green Tea from China.

On the middle shelf are specimens of paper stock and finished paper made from bamboo.

On the left side of this Case observe stems of *Bambusa Brandisii*, Munro, from India.

[A fine stem of this species, 86 feet long, is shown in front of the upper gallery in Museum No. III.]

CASE 126. Along the top of the Case is a LANCE, as used by the British cavalry, the shaft made of the stem of the MALE BAMBOO (*Dendrocalamus strictus*, Nees); rough stems of this species are also shown, as well as the crushed stem as prepared for exportation from India for paper making. The following specimens are also exhibited in this Case: Stems of *D. Hamiltonii*, Nees. and Arnot; *D. membranaceus*, Munro; *D. giganteus*, Munro; and *D. longispathus*, Kurz., *Gigantochloa macrostachya*, Kurz. Mat made in Sierra Leone of split stems of *Oxytenanthera* sp. Also African spears from the River Niger. The shafts are probably made of the stems of *Oxytenanthera abyssinica*, Munro.

The Table Case in the centre of the room contains a miscellaneous collection of Bamboo products, consisting of hats, baskets, walking sticks, pipe stems, combs, musical instruments, snuff-boxes, fans, &c., from India, China, Japan, Straits Settlements, South and Eastern Africa; also a box made in Ceylon of the CLOUDED or SPOTTED BAMBOO (*Teinostachyum maculatum*, Trim.).

CASES 127 and 128. On the landing at the top of the descent staircase on either side of the doorway leading from the Gallery or Room No. 9 observe PANELS carved in the stem of the HAIRY BAMBOO (*Dendrocalamus latiflorus*, Munro), from Wenchow. The stems are boiled to make them soft; they are then opened and flattened by pressure, and after being scraped are ready for carving.

CASES 127 and 128.

Observe also stems of *Cephalostachyum capitatum*, Munro, *C. pergracile*, Munro, and *Dinochloa Maclellandii*, Kurz. In the upper part of Case 128 are stems of *Melocanna bambusoides*, Trin., beaten into fibre, from Berar; also stems of *Ochlandra stridula*, Thw., and clothes basket, fish basket, rice strainer, and rice sifters from Ceylon, made of split stems of this species. Observe also fruits of *Melocanna travancorica*, F. Muell. and fruits of *M. bambusoides*, Trin.

ROOM NO. 11.

Cryptogams.

This room is devoted to CRYPTOGAMS or Flowerless Plants, plants which do not bear manifest flowers, nor produce seeds containing an embryo as do PHANEROGAMS or Flowering Plants. They are divided into two great series *Cormophyta* and *Thallophyta;* in the former, as in flowering plants, there is a manifest distinction between stem and leaf; in the latter this distinction does not obtain.

CORMOPHYTA.

TABLE CASE A.

Club-moss Order (*Lycopodiaceæ*). Terrestrial perennials or rarely annuals, distinguished by having all the sporangia of one size, and usually arranged in cones terminating the forked branches; leaves generally of one size and equally distributed round the stem.

The species are widely distributed, but were more abundant, of larger size, and more highly organised during early geological periods than at the present day. *Lepidodendron* and *Sigillaria* are fossil forms allied to this and the next group, specimens of which are exhibited. The order is of very little economic importance.

Plants of several species of *Lycopodium* are shown. In the lower part observe DOOR MATS from Sweden made of *Lycopodium clavatum*, L. Note also a sample of the spores of this species which are of a sulphur yellow colour, highly inflammable, and at one time used for producing artificial lightning in theatres.

Selaginella Order (*Selaginellaceæ*). Allied to the Club-moss order, but distinguished by having sporangia of two

TABLE CASE A.

sizes. In the large genus *Selaginella* the leaves are of two sizes, very small, and all arranged in one plane on the stem; in *Isoetes*, an aquatic genus, the leaves form a dense rosette, and resemble a quill in form, hence the popular name QUILLWORTS.

A specimen of the HYGROMETRIC CLUB-MOSS (*Selaginella lepidophylla*, Spreng.) from Mexico is shown. It spreads out in a flat rosette when wet and closes up into a ball when dry.

A diagram illustrating the structure of *Selaginella helvetica*, Spreng., is shown on the wall of the descent staircase.

TABLE CASE B.

Horse-tail Order (*Equisetaceæ*). Perennial, terrestrial, or aquatic plants with subterranean rhizomes and straight, jointed stems bearing whorls of leaves. Owing to the presence of a large amount of silica, the stems are so rough that they are used to polish wood, and even metals. The fruit forms a cone at the tip of the stem, and in some species is produced on special, fertile, branchless stems, destitute of green colour.

Calamites is a fossil form of this order that attained a large size during the Carboniferous period. Some specimens are exhibited.

Several species of *Equisetum* occur in this country, but the best known for its economic uses is *Equisetum hyemale*, L., which is also found in other parts of Europe, North Africa, North Asia, and North America.

No. 211. Rings of DUTCH RUSHES the twisted stems of *E. hyemale* known as ASPRELLA in Pavia where they are sold at one halfpenny for 12 rings and used for cleaning wooden spoons, platters, &c.

A sample of the chopped stems of this species as used in medicine in North China is shown in the lower division of this case. Near this is a mounted specimen of *E. giganteum*, L., from Rio Janeiro, and in the upper part of the case observe stems of *E. sylvaticum*, L., used at Munich for cleaning pewter, also fine mounted specimens of plants of *E. Telmateia*, Lam., from near Bonsall, Derbyshire. A diagram showing structure of this species is shown on the wall of the descent staircase.

Pillwort Order (*Rhizocarpeæ*). Aquatic, or growing in damp places, mostly natives of warm regions. Sporangia are of two sizes.

No. 212. Spore cases of the Nardoo (*Marsilea Drummondii*, A. Braun.) from the Diamantina district, Queensland. They are beaten between stones until they are reduced to powder which is mixed with water and baked into a kind of bread, a sample of which is shown.

TABLE CASE B.

Fern Order (*Filices*). A group of arborescent or herbaceous, perennial, very rarely annual plants. Alternation of generations is well marked, the sexual stage or prothallus being minute, whereas the asexual or spore-bearing stage is large, and is the portion popularly considered as constituting the entire plant. The spores are usually borne on the under surface of the frond, rarely grouped on specialised branches, as in the Royal Fern (*Osmunda regalis*, L.). In the arborescent forms they may grow to a height of 80 feet.

TABLE CASE C.

The order is abundant in all moist climates in nearly all degrees of temperature, but is of very little economic value.

The remains of ferns are present in nearly all strata from the Devonian upwards, and were very abundant during the Carboniferous period.

In the upper part of the Case are specimens of the Royal Fern (*Osmunda regalis*, L.) and in the lower division is a portion of a stem of the Dwarf Tree Fern, of Sealer's Cove, Victoria (*Todea barbara*, Moore), and a plant of *Platycerium Stemmaria*, Desv., var. *elephantotis*. (*See* also Case 129.)

In the top of the Case observe portions of stems of *Cyathea dealbata*, Sw., from New Zealand, and *C. arborea*, Sw., from the Souffrière, St. Vincent, &c.

TABLE CASE D.

No. 213. Hat made of the stipes of the Nito (*Lygodium* sp.) from the province of Fayabas, Island of Luzon. Note also a broom made of stipes of *L. scandens*, Sw., from Ceylon.

Observe the long, creeping rhizome of *Lastræa thelypteris*, Presl., commonly called the root; the true roots are the blackish fibres springing from the underside of the rhizome.

The upper part of this Case contains—Polypody Root, the rhizome of *Polypodium vulgare*, L. Dried fronds of *Adiantum caudatum*, L., from India; said to be used in Bourbon for making Sirop de Capillaire. *A. Capillus—Veneris*, L. known as the Capillaire of Montpellier, and used in Europe for a similar purpose. *A. venustum*, Don., an Indian species said to possess astringent and aromatic properties.

TABLE CASE E.

In the lower part of the Case note stems of *Blechnum brasiliense*, Desv., from Brazil; *Lomaria magellanica*, Desv., TABLE CASE E.

from Tristan d'Acunha, also fronds of DORADILLA (*Nothochlæna hypoleuca*, Kunze,) used in Chili as a diuretic and expectorant.

TABLE CASE F.

No. 214. ARUHE the rhizomes of *Pteris aquilina*, L. var. *esculenta*. They were formerly roasted and eaten by the natives of New Zealand.

No. 215. BRAKE or BRACKEN (*Pteris aquilina*,) Britain, from the rhizomes of which a farinaceous food has been obtained and used in times of scarcity. Meal prepared from the rhizomes of this fern and used as food in Japan is here shown. Note also ASH BALLS made from ashes of the burnt fronds of the Brake, which are collected by the cottagers in Monmouthshire during the summer months and burnt. The ash is then moistened sufficiently to enable it to be moulded into balls, which are afterwards dried, and are ready for use in washing all kinds of clothing. They were formerly sold at from 3*s.* to 4*s.* per hundred in the market, but the more general use of soda has reduced the demand for them. The extreme variability of shape in the fronds of many ferns is well illustrated in *Pteris quadriaurata*, Retz. A mounted specimen is shown.

No. 216. Nest of tea boxes and ornamental tray made of stipes of *Gleichenia glauca*, Sw., from Japan. Note also a MALAY HAT from Perak, made of the fibrous bundles of the same fern.

In the lower part of this Case observe stems of *Brainea insignis*, Hook., from Khasia and Hong Kong.

TABLE CASE G.

The upper and lower portions of this Case contain sections of stems of *Alsophila australis*, R. Br., and other species. (*See* also Cases 129 and 131.)

TABLE CASE H.

Observe a series of dissections of the trunk of a tree-fern, showing its structure.

In the lower portion of the Case observe portions of trunk of *Lomaria gibba*, Lab., from New Caledonia and *L. boryana*, Willd., grown in Jamaica.

No. 217. Fine specimen of *Acrostichum drynarioides*, Wall., showing the transition from broad, green, fertile fronds to narrow, fertile ones completely covered with fructification on the under surface.

CASE 129.

In the upper part of the Case is a dried plant of *Platycerium Wallichii*, Hook., from Moulmein, and in the centre a large plant from Singapore. (*See* also Table Case C.)

CASE 129.

No. 218. Transverse section from base of a trunk of a tree-fern (*Alsophila australis*, R. Br.). A species growing sometimes to the height of 70 feet and found in Queensland, New South Wales, Victoria, and Tasmania. (*See* also Case 131, and Table Case G.)

Between Cases 129 and 142 observe designs for muslin dress fabrics, taken from *Adiantum reniforme*, L., and from species of *Selaginella*, and on the other side of the doorway note pattern obtained from *Pilularia globulifera*, L.

CASE 130.

Observe diagrams illustrating the structure of *Aspidium Filix-mas*, Sw., and Prothallus of *Aspidium*.

No. 219. PENGHAWAR JAMBI, the stipes of *Dicksonia Barometz*, Link., from Java. The soft silky hairs which cover the stipes have been recommended as a styptic.

Observe a specimen of PULU, the hairs from the young stipes of *Dicksonia glauca*, L., imported from the Sandwich Islands, and used at one time for stuffing cushions.

The remainder of this Case is occupied with fine specimens of the trunk of *Dicksonia squarrosa*, Sw., a native of New Zealand, *D. antarctica*, Lab., from Australia. (*See* New Zealand and Australian Collections. Museum No. III.) *D. arborescens*, L'Herit, from St. Helena, and *D. sellowiana*, Hook., from Brazil.

CASE 131.

This case contains trunks of tree-ferns belonging to the genus *Alsophila* as follows:—*A. australis*, R. Br., a species found in New South Wales, Queensland, Victoria, and Tasmania. [Two fine trunks, one 50 feet and the other 24 feet high, are exhibited in the Victoria and New South Wales Collections in Museum No. III.] *A. leichhardtiana*, F. Muell., a native of Queensland and New South Wales, *A. armata*, Presl., from Jamaica, *A. aspera*, R. Br., from St. Vincent and Demerara; and the following species from Brazil, *A. ferox*, Presl., *A. Miersii*, Hook., *A. pruinata*, Kaulf., *A. phalerata*, Mart., *A. plagioptera*, Mart., *A. Tænitis*, Hook., *A. paleolata*, Mart., *A. leucolepis*, Mart., and *A. parvula*, Jenm., from Jamaica, showing abnormal basal outgrowths.

CASE 132.

Trunks of the genus *Alsophila* are contained in this case and include the following species:—*A. ornata*, J. Scott, *A. contaminans*, Wall., *A. latebrosa*, Hook., *A. comosa*, Wall., *A. Oldhami*, Bedd., *A. glabra*, Hook., *A. Andersoni*, J. Scott, all from India; and *A. Boivini*, Mett., from the Comoro Islands, Johanna.

CASE 133. The following species of tree-fern trunks are here exhibited:—*Hemitelia decipiens*, J. Scott., from India; *H. capensis*, Br., from South Africa; *H. setosa*, Mett., from Brazil; *Cyathea serra*, Willd., from Jamaica. [A fine specimen of this species is shown on one of the buttresses in Museum No. III.] *C. Burkei*, Hook., from Natal (*See also* Natal Collection, Museum, No. III.); *C. gracilis*, Gr., and *C. arborea*, Sm., from Jamaica.

CASE 134. The collection of tree-fern trunks is continued in this case as follows:—*C. manniana*, Hook., from Fernando Po; *C. Schanschin*, Mart., from Brazil; *C. medullaris*, Sw., from New Zealand, and *C. Hildebrandtii*, Kuhn., from the Comoro Islands.

CASE 135. **Moss Order** (*Musci*). **Mosses are widely distributed and occur in all climates, growing on the ground, rocks, and trunks of trees; some are aquatic. Alternation of generations is very marked, the leafy stem bearing the sexual reproductive organs, the sporangium or fruit, with its stalk being the asexual stage.**

The earliest fossil remains of mosses occur in tertiary rocks.

No. 220. *Catharinea dendroides*, Hedw., a native of elevated regions in Chili, is one of the largest of the moss family.

Specimens of the following mosses are contained in this Case:—*Bryum capillare*, L., *Webera sessilis*, L., *Dicranella heteromalla*, Schimp.

No. 221. **PEAT composed entirely of *Hypnum filicinum*, Mitten, found at 15 feet below the surface of a mere in Norfolk.**

Observe diagram illustrating structure of *Polytrichum gracile*, Menz.

CASE 136. **No. 222.** **HASSOCK made of HAIR MOSS (*Polytrichum commune*, L.), from Yorkshire, and brooms from Sussex and from Berne in Switzerland, where they are used by weavers under the name of WEBER-BÜRSTE or WURZEL-BÜRSTE.**

No. 223. BOG MOSS (*Sphagnum cymbifolium*, Ehrh.). In constant use in building houses in Norway for stuffing between the timbers to render the house weather proof. In most parts of the world peat is almost entirely composed of *Sphagnum*.

Liverwort Order (*Hepaticæ*), shown at bottom of Case 135. A small order of plants closely allied to the mosses, differing in the wall of the capsule or fruit, splitting into four valves at maturity, also in the presence of spiral threads, called elaters, mixed with the spores. The general structure of the vegetative part is simpler that in the mosses. CASE 135.

Some diagrams illustrating the structure of *Marchantia* are shown in front of Gallery (Room No. 9).

Stonewort Order (*Characeæ*). A small order of aquatic plants with long slender stems, bearing whorls of leaves and branches. Many of the species become incrusted with carbonate of lime, hence the popular name. CASE 142.

Specimens and plates illustrating this order are exhibited, and a diagram showing structure of *Chara fragilis*, A. Br. will be found on Gallery (Room No. 9).

THALLOPHYTA.

Seaweeds (*Algæ*). An extensive group of plants growing in salt or fresh water, or on damp ground. The vegetative portion, called a thallus, is not differentiated into stem and leaves. Chlorophyll is present, but the green tint is often masked by the presence of other colouring matters, as bright rose-red or brown.

Some exhibit an extreme simplicity of structure, consisting of single microscopic cells, as the Red Snow (*Chlamydococcus nivalis*, Br., and others), which in arctic and alpine countries sometimes appear in quantity. The substance of several marine species is chemically similar to starch, and like it, swells in boiling water.

I. *PHÆOSPOREÆ*—The seaweeds included in this order are of a dark brown or olive-green colour, and vary in size from microscopic forms to species that attain a length of hundreds of feet, as in *Macrocystis*. All the species are reproduced asexually by motile zoospores.

No. 224. Portion of a frond of *Durvillea utilis*, Bory. Found abundantly in the Southern Ocean, attached to rocks and sometimes serving as a natural breakwater, and also as a refuge for fish, crustacea and mollusca. It is eaten as food on the coast of Chili.

No. 225. Walking sticks, umbrella handles, sword handles, knife handles, &c., made of Laminarian Horn, pre-

CASE 142. pared from *Laminaria buccinalis*, Ag., (Ecklonia buccinalis, *Hornem.*) a native of the Cape of Good Hope.

Observe SEA TANGLE (*Laminaria digitata*, L.). Abundant on our rocky coasts. Surgical instruments made of the hard dry stipes are shown.

Note sample of KOBI or KONBU (*Laminaria saccharina*, L.), from Japan, where it is used as food. It is abundant on our own coasts.

No. 226. Frond, bearing air bladders, of *Macrocystis pyrifera*, Ag. This is said to be the longest of the seaweeds, a single plant being often 100 feet long. Immense masses are found in every latitude ranging from the Antarctic to the Arctic Circle.

II. *FUCACEÆ.*—The plants resemble those included in the *Phæosporeæ* in colour, but differ in the absence of any asexual mode of reproduction. A diagram showing structure of *Fucaceæ* is shown on Gallery (Room No. 9).

No. 227. KELP, the ash of the common SEA WRACK (*Fucus vesiculosus*, L., with other species), burnt in the open air. It was formerly the principal source from whence the soda used in soap and glass-making was obtained. It is still to a limited extent a source of Iodine.

Note SULPHATE of POTASH, CHLORIDE of POTASSIUM, and IODINE manufactured from Kelp.

CASE 143. **No. 228.** GULF WEED (*Sargassum bacciferum*, Ag.). Found in enormous quantities floating in the Atlantic to the west of the Azores, from 20° to 36° north latitude, and again west of the Bahamas.

Observe the natural perforations in the broad, flat frond of *Agarum Turneri*, P. and E.

III. *FLORIDEÆ.*—A group of algæ known by the bright rose-red or purple colour of the thallus, and by the antherozoids being destitute of cilia. Some of the species become incrusted with carbonate of lime and form rigid, strong masses, popularly called CORALLINES.

A diagram illustrating structure in *Florideæ* is shown on Gallery (Room No. 9).

No. 229. IRISH MOSS or CARRAGEEN, (*Chondrus crispus*, Lyngb.) One of the few marine plants used as food in Europe. It is abundant on our rocky coasts and is collected in the north and north-west of Ireland for cattle feeding and dietetic purposes; it is also imported from Holland. CASE 143.

Gigartina mammillosa, J. Ag., is frequently collected with it and used as a substitute.

No. 230. CEYLON MOSS (*Gracilaria lichenoides*, J. Ag.). A whitish seaweed growing on rocks in the Indian and Malayan Seas. It is collected and made into a kind of jelly and used as food.

No. 231. JELLY WEED (*Eucheuma speciosa*, J. Ag.). A gelatinous seaweed cast ashore on the coast of Western Australia, where it is collected and used for making jelly, blanc mange, and also for making size.

Observe specimens of AGAR AGAR (*Eucheuma spinosa*, J. Ag.), used in India as food.

Note specimen of PURPLE DULSE (*Iridæa edulis*, Bory). It is found on the rocky shores of our coasts and is sometimes eaten as food in times of scarcity.

No. 232. *Europherix pinnatifida*, Ag. Used as food in Japan.

Note specimen of *Catenella impudica*, Lepr., also used as food in Japan.

In the upper part of this Case observe diagram showing structure of *Polysiphonia subulata*, Ag. CASE 144.

No. 233. Specimen of *Gelidium corneum*, Stackh., and samples of prepared food as used in Japan.

Observe specimen of *Gymnogongrus japonicus*, Suring. Used by Japanese masons in the preparation of cement for building purposes.

No. 234. Samples of *Porphyra vulgaris*, Ag., known as LAVER, common on the British coasts and sold in the Swansea market for making a kind of bread. Samples are also shown from Japan where it is used as food under the name of NORI. CASE 145.

No. 235. Specimen of *Glæopeltis intricata*, Lamk. Used by masons in Japan for mixing with cement, and also for stiffening clothes.

Observe a sample of artificially coloured seaweed furnished by a species of *Ceramium*, used in Japan for garnishing dishes under the name of SHIJOJI-ONORI.

CASE 146. IV. *ULVACEÆ.*—Marine or fresh-water algæ of a bright green colour, forming flat ribbon-like layers, or an irregularly distended tube.

Note bundles of dried seaweed, as used for food in Japan, furnished by *Enteromorpha intestinalis*, Harv., also sample of *E. clathrata*, Ktzg., used in North Formosa as an ingredient for seasoning.

CASE 147. V. *CONFERVEÆ.*—Minute, bright green plants growing in fresh water, sometimes appearing as a felt-like floating layer, as in *Cladophora rivularis*, Ktzg., or forming globular masses as in *C. Ægagropila*, Ktzg., two to four inches across, called MOOR BALLS, in moorland lakes.

VI. *CONJUGATÆ.*—Either one-celled plants as in the *Desmidiaceæ*, or formed of a single, unbranched row of cells, as in *Zygnema*. Most occur in fresh water, a few flourish among damp moss, or on moist ground.

A diagram illustrating structure in *Conjugatæ* is shown on Gallery (Room No. 9).

Diatoms (*Diatomaceæ*) are all microscopic, and consist of a single cell, the wall of which consists of silica, and often presents very beautiful markings under the microscope. Diatoms are met with both in salt and fresh water, their siliceous cell-walls often forming deposits of considerable extent and thickness.

TABLE CASE J. **Mushrooms** (*Fungi*).—The enormous number of plants —over 40,000 kinds—belonging to the present group, differ very much in size, habit, and general appearance, but all agree in the total absence of chlorophyll, the green colouring matter so conspicuous in all other groups of plants, hence all fungi are either parasites, growing on the bodies of living plants or animals; or saprophytes, growing on decaying vegetable or other organic matter.

I. *ASCOMYCETES.*—A large division of the fungi agreeing in having the spores produced within a mother-cell or ascus.

Observe a drawing illustrating the habit and structure of *Exoascus deformans*, Berk., a minute fungus parasitic on living peach leaves.

Exoascus pruni, Fckl., a closely allied species, attacks the young fruit of the sloe, also cultivated plums, and produces the malformations called POCKET PLUMS.

Notice in the upper part of this Case fine specimens of *Peziza Wilkomii*, Hart., parasitic on common larch, causing the disease called LARCH CANKER.

TABLE CASE J.

A diagram showing general structure in *Peziza* is shown on Gallery (Room No. 9).

No. 236. MOREL (*Morchella esculenta*, L.), used in ragoûts and other dishes, *M. crassipes*, Pers., and *M. conica*, L. Also models and specimens of species of *Peziza* and allies. Specimens of wood stained green by the mycelium of *Chrysosplenium aeruginosum*, Tul., used at one time in Tunbridge ware and fancy work.

TABLE CASE K.

Notice the destructive effect of a minute fungus. *Plowrightia morbosa*, Sacc., on living branches of plum trees and allies.

Observe examples of the curious genus *Cordiceps*, the members of which are remarkable for being parasitic on insects.

No. 237. TONG-CHONG-HA-CHO, or SUMMER PLANT and WINTER WORM, of China (*Cordiceps sinensis*, Berk.). This fungus grows upon a species of caterpillar, and the caterpillars, with the fungus attached to them, are made up into small bundles and sold as food by the Chinese.

Cordiceps Taylori, Berk., an Australian species, as well as *C. Gunnii*, Berk., from Tasmania, and *C. Robertsii*, Berk., from New Zealand, are also shown.

No. 238. ERGOT OF RYE, the sclerotium of *Claviceps purpurea*, Tul. A fungus, the mycelium of which traverses the grain and entirely changes its properties and substance from a wholesome food product to a very dangerous poison. Ergot is not confined to rye, but attacks wheat, barley, and many other grasses. Ergot of rye is used in medicine, our supplies being chiefly derived from Vigo, in Spain, and from Teneriffe, and in smaller quantities from France and Hamburg.

A diagram illustrating structure of Ergot is shown on Gallery (Room No. 9).

No. 239. TRUFFLES (*Tuber æstivum*, Vitt.). These differ in form and habit from the majority of fungi, and are found buried beneath the surface of the ground. They have a strong odour, and their presence is therefore detected by dogs trained on purpose to hunt for them. In some continental countries pigs are also employed to hunt for truffles.

Our native supplies of truffles are chiefly obtained from the downs of Wiltshire, Hampshire, Kent, and Sussex. From the continent they are imported either entire or sliced and dried. Truffles are used in cooking, chiefly for flavouring ragoûts. A sample of French Truffles (*Tuber melanosporum*, Vitt.) is shown.

TABLE CASE L.

II. *Lichenes.* The members of the present group are compound organisms, in other words, a lichen consists of two distinct elements, a fungus and an alga, living together in what has been termed commensalism.

Diagrams illustrating the structure of lichens are exhibited on the Gallery (Room No. 9)*; the portions coloured green represent the algal component, the colourless portion the fungus, bearing the fruit.

Lichens grow on rocks, trunks of trees, and on the ground.

No. 240. Reindeer Moss (*Cladonia rangiferina*, Hoff.), common on our hills and heaths in lowland, sub-alpine, and alpine districts. It has a wide geographical range. In Lapland it covers barren plains, and is the food of the reindeer during winter, and it has even, when powdered, been mixed with flour and made into bread in times of scarcity.

Observe sample of *Alectoria jubata*, Ach., known as Tree or Rock Hair or Horse-tail Lichen. It occurs on forest trees, and has a wide geographical range. In the Highlands of Scotland it is used for stuffing mattresses.

The lower part of the Table Case is devoted to specimens of Orchil, Cudbear and Litmus, dye substances obtained from *Roccella tinctoria*, DC., *R. fuciformis*, Ach., and *R. Montagnei*, Bèl., all widely distributed species. Specimens are shown from various countries, together with dyes prepared from them. In commerce they are generally known as Orchella Weeds. At one time the importation of these dye lichens represented a very large sum, of late years, however, they have been declining in consequence of the introduction of the anilin or coal-tar dyes. Litmus is valuable as a test for the presence of acids which change its purple colour to red.

TABLE CASE N.

In the upper part of this Case observe the following:— Specimens of woollen materials dyed in Scotland with *Parmelia saxatilis*, L., one of the lichens popularly known as Crottal. Sample of *Parmelia perlata*, Ach., a species common in lowland and sub-alpine districts, and at one time imported to a considerable extent into London from the Canary Islands, under the name of Canary Rock Moss, for dyeing.

TABLE CASE M.

No. 241. Iceland Moss (*Cetraria islandica*, Ach.). It has a wide range in arctic and antarctic climates, and grows abundantly on most of our higher northern mountains. It contains a large amount of starch, and is consequently used as an article of food. Boiled in water it yields a good firm jelly, which, after the removal of the bitter purgative principle, is used, flavoured with wines, sugar, spices, &c., as an article of food.

TABLE CASE M.

In the lower division of the Case are samples of MANNA, the produce of *Lecanora esculenta*, Eversm., and *L. affinis*, Lind., species found on the sides of mountains in Persia. They are said to have appeared suddenly at different times covering large tracts of country in Persia, the Steppes of Tartary, near Damascus, in Algeria, and other parts, with a layer from three to six inches thick, the inhabitants believing that they descended miraculously in the form of rain, hence the name of MANNA has been applied to them and the people have used them, as food.

TABLE CASE K.

III. *UREDINEÆ.*—CEDAR APPLES (*Gymnosporangium juniperi* Link.), parasitic on branches of common juniper, illustrate the group of fungi known as UREDINEÆ, the members of which are remarkable for assuming very different forms during different stages of their development, and in many kinds the different stages of the same individual grow on different host-plants. The spores of the *Gymnosporangium* stage on juniper produce later in the season a second form of the fungus, the *Æcidium* stage on living leaves of the mountain ash; the spores of the *Æcidium* stage in turn produce the *Puccinia* stage on juniper.

All the species are parasites, *Puccinia graminis*, Pers., the WHEAT SMUT doing injury to wheat and other cereals to the amount of several millions sterling annually. A diagram illustrating structure in *Puccinia* is shown on Gallery (Room No 9).

IV. *BASIDIOMYCETES.* A large group of fungi including the PUFFBALLS, and the gill-bearing forms, as the common MUSHROOM and TOADSTOOLS. The numerous species of *Polyporus* and *Boletus*, having the hymenium or spore-bearing surface lining the cavities of closely crowded minute pores, situated on the under surface of the cap, belong here.

TABLE CASE J.

In the lower part of this Case are some very fine specimens of the common GIANT PUFFBALL (*Lycoperdon Bovista*, L.), an excellent article of food while young and white; used in its mature condition as a styptic and for stupefying bees.

TABLE CASE I.

In the top of this Case observe specimen of *Scleroderma vulgare*, Horn., *S. geaster*, Fr., *Broomiea congregata*, Berk., TABLE CASE I. *Geaster fornicatus*, Huds., *G. michelianus*, W. G. S., *G. coliformis*, Pers., *G. saccatum*, Fr., *G. limbatus*, Fr., and *G. hygrometricus*, Pers.

No. 242. Models and specimens of STINKHORN (*Ithyphallus impudicus*, Fr.), a British species with a very fœtid odour.

Observe LATTICE FUNGUS (*Clathrus cibarius*, Fisch). A beautiful fungus, resembling a hollow sphere of lattice-work. It is eaten by the natives of New Zealand, Tasmania, and West Australia.

CASE 136. **No. 243.** COMMON MUSHROOM (*Agaricus campestris*, L.). The field mushroom, is the best known edible species in Britain, but other kinds are also much esteemed as articles of food, especially *Lactarius deliciosus*, Fr., a species about the size of the mushroom and recognised with certainty by the gills and cap giving out a red liquid when bruised. The common mushroom, when arranged in layers and sprinkled with salt, yields a liquid known as ketchup.

CASE 137. **No. 244.** *Agaricus melleus*, Fr. A dingy yellow agaric growing in dense tufts, very destructive to timber trees, its black, cord-like mycelium or spawn passing underground from one tree to another.

No. 245. PE-FOO-LING of the Chinese, the sclerotium of *Lentinus cyathus*, Berk., formerly known as *Pachyma Cocos*, Fr., eaten in China.

In the upper part of the Case observe various specimens of *Fomes australis*, Sacc., a species very widely distributed in the tropics.

CASE 138. **No. 246.** Specimen of *Fomes annosus*, Fr., a fungus that attacks and destroys living trees, especially conifers.

Observe on lower shelf a fine specimen of *Fomes lateritius*, Sacc., from Demerara, also specimens of an abnormally developed fungus described as *Polyporus officinalis*, Fr., from British North America, where it is used by the Indians as a purgative. It was formerly used in English pharmacy.

CASE 139. Observe in upper part of Case a large specimen of *Fomes cytisinus*, Sacc., found growing on pitch pine joists in the Bank of England. The whole mass measured six feet three inches in diameter, and weighed thirty-two pounds.

TABLE CASES I. and J. In the lower parts of these Cases observe a large series of specimens of AMADOU or GERMAN TINDER, prepared from *Fomes fomentarius*, Sacc., parasitic on the oak, birch, &c. Amadou is prepared by cutting the fungus into thin slices, beating them and soaking them in a solution of nitre. Black Amadou is impregnated with gunpowder. TABLE CASES I. and J.

Besides its use as tinder, slices of *F. fomentarius* have been used for various other purposes, such as for making caps, table mats, artificial flowers, &c., samples of which are shown.

Observe various specimens of *Polyporus lucidus*, Fr., found all over the world, and held in great veneration by the Chinese. CASE 139.

No. 247. *Polyporus sulfureus*, Fr., a large yellow fungus of a cheesy consistency, is very injurious to forest trees and worked timber. A specimen is shown of the timber of H.M. Ship "Lord Clyde" attacked by it.

No. 248. NATIVE BREAD of Tasmania, the sclerotium of *Polyporus mylittæ*, Cke. and Mass. Formerly called *Mylitta australis*, Berk. A photograph illustrating a sclerotium bearing a fully developed fungus is shown. CASE 141.

Observe a series of specimens of *Polystictus sanguineus*, Sacc., a fungus widely distributed in the tropics, and of a bright blood-red colour when living. CASE 140.

No. 249. *Hydnum coralloides*, Scop., in its early stages it resembles a cauliflower, and occurs in this country on decayed trees and stumps, especially those of fir, beech, and ash; in Kashmir it grows on living trees of *Abies webbiana*. It is called KAHOKHUR, and is largely sought after as an article of food. CASE 141.

No. 250. Portion of a joist from the floor of a church, showing the progress of decay caused by DRY ROT, the mycelium of *Merulius lacrymans*, Jacq.

Observe also a very large mass of the mycelium of this species taken from the interior of a wooden horse used to display armour in the Tower of London.

No. 251. *Hirneola polytricha*, Mont., a fungus growing on wood in the northern island of New Zealand, also in India and Java. Very large quantities of this fungus are exported from New Zealand to China, where the retail price averages about one shilling per pound. It is also cultivated by the Chinese, and used by them as a medicine, and as an ingredient in soups, &c. (See *Kew Bulletin*, 1890, pp. 217, 220.)

Observe specimens of *Hirneola rufa*, Berk., used as food in Japan.

CASE 140. **No. 252.** Dress made of WALOA, the cord-like compacted mycelium of a *Polyporus*, at one time called RHIZOMORPHA. Also waist-belt made of the same, ornamented with shells from Humboldt Bay, New Guinea.

CASE 147. V. *MYXOMYCETES.*—A small, but widely distributed group of organisms, remarkable for the power of voluntary movement during the earliest stage of their development. For this reason the group is considered by some authorities as belonging to the animal kingdom. At maturity fruits are formed closely resembling those present in some groups of fungi.

Fuligo varians, Rost., popularly known as FLOWER OF TAN is not uncommon during its early stage as a bright yellow semi-liquid mass, slowly creeping over heaps of dead leaves, or on tan in greenhouses.

PROTOPHYTA include the simplest known forms of plant life, reproduction is effected by the breaking up of the parent plants.

No. 253. KEIH-SEEN-ME (*Nostoc edule*, Ag.), eaten as a delicacy by the Chinese.

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